Electric Drives and Controls | Hydraulics | Linear Motion and Assembly Technologies | Pneumatics | Service

Rexroth Bosch Group

Rexroth IndraControl VPB 40.1 Control Cabinet PC

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1 System Presentation

1.1 Brief Description VPB 40.1

The VPB 40.1 is a control cabinet PC that forms a PC-based operator terminal when combined with a VDP 16, VDP 40 or VDP 60 display. Depending on the application or configuration, the operator terminal can also fulfill the control functionalities.

Fig.1-1: VPB 40.1 with 3-slot box and connected display VDP (not included in the scope of delivery)

The VPB 40.1 is connected to the G4 or G5 serial display interface of VDP 16, VDP 40 or VDP 60 via a connecting cable with a length of up to 30 m. Thus, the VPB 40.1 can be installed in the control cabinet and the display in its door or at the machine.

The VPB 40.1 consists of two tightly connected parts:

- The PC box contains the actual PC, including the hard disk and the power supply unit with uninterruptible power supply (UPS). Depending on the variant the PC box provides three or four slots. The standard interface and some special interfaces are available on a plugboard.
- The display interface and a RS422 interface (X39), which is to be used as alternative for the 24 V interface XCOM1, are integrated in the second housing part mounted on the PC box. Furthermore, five LEDs to display device states and errors are arranged on this housing. Also, the optionally available DVD ROM drive or the CD RW recorder system are mounted here.

1.2 Variants

1.2.1 Characteristic Features

The VPB 40.1 is available in two different housing variants. The possible variants are described in the designation codes, see chapter 11.1 "Type Designation Code" on page 73. Principally, they differ in the used PC box equipped with 3 or 4 slots.

PC box	Type A	Type C
Free slots	3	4
Voltage supply	AC 85 V to AC 264 V or DC 24 V	

System Presentation

PC box	Type A	Type C
Integrated UPS	Integrated UPS logic, Battery packs to be connected externally	
Optional drives	DVD-ROM, DVD-ROM / CD-RW	

Fig.1-2: PC box, type A and type C

1.3 Operating System

For license reasons the VPB 40.1 is only delivered with already installed operating system.

1.4 Commissioning

Mount the device properly, see also chapter 5 "Dimensions, Installation" on page 25. Then connect the device to the power supply and, if required, to the network.

2 Important Instructions on Use

2.1 Appropriate Use

2.1.1 Introduction

Rexroth products represent state-of-the-art developments and manufacturing. They are tested prior to delivery to ensure operational safety and reliability.

⚠ WARNING **Physical injury and material damage might result from an inappropriate use of the products!**

The products are designed for the use in an industrial environment and may therefore only be used for the intended purpose. If they are not used as intended, situations causing personal injury as well as material damage can occur.

☞ Rexroth disclaims as manufacturer any warranty, liability or damages occurring due to inappropriate use of the products. Furthermore, Rexroth is not paying any compensation. The user is responsible for any risks resulting from inappropriate use of the products.

Before using Rexroth products, the following requirements must be met to ensure appropriate use of the products:

- Anyone handling one of the Rexroth products in any way has to read and understand the respective safety-related guidelines as well as the instructions on appropriate use.
- Hardware products have to remain in their original state, in other words, no modification regarding the design are allowed. Software products must not be decompiled and their source codes must not be modified.
- Damaged or faulty products must not be implemented or put into operation.
- It must be ensured that the products are installed as specified in the documentation.

2.1.2 Areas of Use and Application

The VPB 40.1 by Rexroth is a control cabinet PC and becomes a PC-based operator terminal when used with a VDP display. Depending on the application and configuration, control functionality can also be carried out.

NOTICE **Danger of destruction of the device if not expressly stated accessories, add-on components and other components, cables, conduits, software and firmware is used.**

The VPB 40.1 may only be used with the accessories and add-on components specified in this documentation. Components not named expressly mentioned must neither be mounted nor connected. The same applies to cables and conduits.

The products may only be operated with the expressly stated configurations and component combinations as well as with the software and firmware which is given and specified in the respective functional description.

Typical areas of application of the VPB 40.1 are:

- Handling systems and assembly systems
- Packaging and food processing machines
- Printing machines and paper converting machines
- Machine tools
- Wood working machines

The VPB 40.1 may only be operated under the assembly conditions and installation conditions, in the specified position of application and under the specified ambient conditions (temperature, degree of protection, humidity, EMC etc.) given in this documentation.

2.2 Inappropriate Use

The application of VPB 40.1 that are not whithin the specicified areas of application or under operating conditions deviating from the operating conditions and technical data specified in the documentation are considered as "inappropriate".

VPB 40.1 must not be used if ...

- it is exposed to operating conditions that do not fulfill the ambient conditions specified. For instance, operation under water, in case of extreme variations of temperature or in extreme maximum temperatures is not allowed.
- the intended applications have not expressly been allowed by Rexroth. Please note the general specifications in the general safety instructions!

3 Safety Instructions for Electric Drives and Controls

3.1 Definitions of Terms

Application Documentation Application documentation comprises the entire documentation used to inform the user of the product about the use and safety-relevant features for configuring, integrating, installing, mounting, commissioning, operating, maintaining, repairing and decommissioning the product. The following terms are also used for this kind of documentation: User Guide, Operation Manual, Commissioning Manual, Instruction Manual, Project Planning Manual, Application Manual, etc.

Component A component is a combination of elements with a specified function, which are part of a piece of equipment, device or system. Components of the electric drive and control system are, for example, supply units, drive controllers, mains choke, mains filter, motors, cables, etc.

Control System A control system comprises several interconnected control components placed on the market as a single functional unit.

Device A device is a finished product with a defined function, intended for users and placed on the market as an individual piece of merchandise.

Electrical Equipment Electrical equipment encompasses all devices used to generate, convert, transmit, distribute or apply electrical energy, such as electric motors, transformers, switching devices, cables, lines, power-consuming devices, circuit board assemblies, plug-in units, control cabinets, etc.

Electric Drive System An electric drive system comprises all components from mains supply to motor shaft; this includes, for example, electric motor(s), motor encoder(s), supply units and drive controllers, as well as auxiliary and additional components, such as mains filter, mains choke and the corresponding lines and cables.

Installation An installation consists of several devices or systems interconnected for a defined purpose and on a defined site which, however, are not intended to be placed on the market as a single functional unit.

Machine A machine is the entirety of interconnected parts or units at least one of which is movable. Thus, a machine consists of the appropriate machine drive elements, as well as control and power circuits, which have been assembled for a specific application. A machine is, for example, intended for processing, treatment, movement or packaging of a material. The term "machine" also covers a combination of machines which are arranged and controlled in such a way that they function as a unified whole.

Manufacturer The manufacturer is an individual or legal entity bearing responsibility for the design and manufacture of a product which is placed on the market in the individual's or legal entity's name. The manufacturer can use finished products, finished parts or finished elements, or contract out work to subcontractors. However, the manufacturer must always have overall control and possess the required authority to take responsibility for the product.

Product Examples of a product: Device, component, part, system, software, firmware, among other things.

Project Planning Manual A project planning manual is part of the application documentation used to support the sizing and planning of systems, machines or installations.

Qualified Persons In terms of this application documentation, qualified persons are those persons who are familiar with the installation, mounting, commissioning and operation of the components of the electric drive and control system, as well as with the hazards this implies, and who possess the qualifications their work requires. To comply with these qualifications, it is necessary, among other things,

1) to be trained, instructed or authorized to switch electric circuits and devices safely on and off, to ground them and to mark them

2) to be trained or instructed to maintain and use adequate safety equipment

3) to attend a course of instruction in first aid

User A user is a person installing, commissioning or using a product which has been placed on the market.

3.2 General Information

3.2.1 Using the Safety Instructions and Passing Them on to Others

Do not attempt to install and operate the components of the electric drive and control system without first reading all documentation provided with the product. Read and understand these safety instructions and all user documentation prior to working with these components. If you do not have the user documentation for the components, contact your responsible Bosch Rexroth sales partner. Ask for these documents to be sent immediately to the person or persons responsible for the safe operation of the components.

If the component is resold, rented and/or passed on to others in any other form, these safety instructions must be delivered with the component in the official language of the user's country.

Improper use of these components, failure to follow the safety instructions in this document or tampering with the product, including disabling of safety devices, could result in property damage, injury, electric shock or even death.

3.2.2 Requirements for Safe Use

Read the following instructions before initial commissioning of the components of the electric drive and control system in order to eliminate the risk of injury and/or property damage. You must follow these safety instructions.

- Bosch Rexroth is not liable for damages resulting from failure to observe the safety instructions.
- Read the operating, maintenance and safety instructions in your language before commissioning. If you find that you cannot completely understand the application documentation in the available language, please ask your supplier to clarify.
- Proper and correct transport, storage, mounting and installation, as well as care in operation and maintenance, are prerequisites for optimal and safe operation of the component.
- Only qualified persons may work with components of the electric drive and control system or within its proximity.
- Only use accessories and spare parts approved by Bosch Rexroth.
- Follow the safety regulations and requirements of the country in which the components of the electric drive and control system are operated.
- Only use the components of the electric drive and control system in the manner that is defined as appropriate. See chapter "Appropriate Use".
- The ambient and operating conditions given in the available application documentation must be observed.
- Applications for functional safety are only allowed if clearly and explicitly specified in the application documentation "Integrated Safety Technology". If this is not the case, they are excluded. Functional safety is a safety

concept in which measures of risk reduction for personal safety depend on electrical, electronic or programmable control systems.

- The information given in the application documentation with regard to the use of the delivered components contains only examples of applications and suggestions.

  The machine and installation manufacturers must

  – make sure that the delivered components are suited for their individual application and check the information given in this application documentation with regard to the use of the components,

  – make sure that their individual application complies with the applicable safety regulations and standards and carry out the required measures, modifications and complements.

- Commissioning of the delivered components is only allowed once it is sure that the machine or installation in which the components are installed complies with the national regulations, safety specifications and standards of the application.
- Operation is only allowed if the national EMC regulations for the application are met.
- The instructions for installation in accordance with EMC requirements can be found in the section on EMC in the respective application documentation.

  The machine or installation manufacturer is responsible for compliance with the limit values as prescribed in the national regulations.
- The technical data, connection and installation conditions of the components are specified in the respective application documentations and must be followed at all times.

National regulations which the user must take into account

- European countries: In accordance with European EN standards
- United States of America (USA):
  – National Electrical Code (NEC)
  – National Electrical Manufacturers Association (NEMA), as well as local engineering regulations
  – Regulations of the National Fire Protection Association (NFPA)
- Canada: Canadian Standards Association (CSA)
- Other countries:
  – International Organization for Standardization (ISO)
  – International Electrotechnical Commission (IEC)

3.2.3 Hazards by Improper Use

- High electrical voltage and high working current! Danger to life or serious injury by electric shock!
- High electrical voltage by incorrect connection! Danger to life or injury by electric shock!
- Dangerous movements! Danger to life, serious injury or property damage by unintended motor movements!
- Health hazard for persons with heart pacemakers, metal implants and hearing aids in proximity to electric drive systems!
- Risk of burns by hot housing surfaces!

- Risk of injury by improper handling! Injury by crushing, shearing, cutting, hitting!
- Risk of injury by improper handling of batteries!
- Risk of injury by improper handling of pressurized lines!

3.3 Instructions with Regard to Specific Dangers

3.3.1 Protection Against Contact with Electrical Parts and Housings

☞ This section concerns components of the electric drive and control system with voltages of **more than 50 volts**.

Contact with parts conducting voltages above 50 volts can cause personal danger and electric shock. When operating components of the electric drive and control system, it is unavoidable that some parts of these components conduct dangerous voltage.

High electrical voltage! Danger to life, risk of injury by electric shock or serious injury!

- Only qualified persons are allowed to operate, maintain and/or repair the components of the electric drive and control system.
- Follow the general installation and safety regulations when working on power installations.
- Before switching on, the equipment grounding conductor must have been permanently connected to all electric components in accordance with the connection diagram.
- Even for brief measurements or tests, operation is only allowed if the equipment grounding conductor has been permanently connected to the points of the components provided for this purpose.
- Before accessing electrical parts with voltage potentials higher than 50 V, you must disconnect electric components from the mains or from the power supply unit. Secure the electric component from reconnection.
- With electric components, observe the following aspects:

  Always wait **30 minutes** after switching off power to allow live capacitors to discharge before accessing an electric component. Measure the electrical voltage of live parts before beginning to work to make sure that the equipment is safe to touch.
- Install the covers and guards provided for this purpose before switching on.
- Never touch electrical connection points of the components while power is turned on.
- Do not remove or plug in connectors when the component has been powered.
- Under specific conditions, electric drive systems can be operated at mains protected by residual-current-operated circuit-breakers sensitive to universal current (RCDs/RCMs).
- Secure built-in devices from penetrating foreign objects and water, as well as from direct contact, by providing an external housing, for example a control cabinet.

High housing voltage and high leakage current! Danger to life, risk of injury by electric shock!

- Before switching on and before commissioning, ground or connect the components of the electric drive and control system to the equipment grounding conductor at the grounding points.
- Connect the equipment grounding conductor of the components of the electric drive and control system permanently to the main power supply at all times. The leakage current is greater than 3.5 mA.
- Establish an equipment grounding connection with a copper wire of a cross section of at least 10 mm^2 (8 AWG) or additionally run a second equipment grounding conductor of the same cross section as the original equipment grounding conductor.

3.3.2 Protective Extra-Low Voltage as Protection Against Electric Shock

Protective extra-low voltage is used to allow connecting devices with basic insulation to extra-low voltage circuits.

On components of an electric drive and control system provided by Bosch Rexroth, all connections and terminals with voltages between 5 and 50 volts are PELV ("Protective Extra-Low Voltage") systems. It is allowed to connect devices equipped with basic insulation (such as programming devices, PCs, notebooks, display units) to these connections.

Danger to life, risk of injury by electric shock! High electrical voltage by incorrect connection!

If extra-low voltage circuits of devices containing voltages and circuits of more than 50 volts (e.g., the mains connection) are connected to Bosch Rexroth products, the connected extra-low voltage circuits must comply with the requirements for PELV ("Protective Extra-Low Voltage").

3.3.3 Protection Against Dangerous Movements

Dangerous movements can be caused by faulty control of connected motors. Some common examples are:

- Improper or wrong wiring or cable connection
- Operator errors
- Wrong input of parameters before commissioning
- Malfunction of sensors and encoders
- Defective components
- Software or firmware errors

These errors can occur immediately after equipment is switched on or even after an unspecified time of trouble-free operation.

The monitoring functions in the components of the electric drive and control system will normally be sufficient to avoid malfunction in the connected drives. Regarding personal safety, especially the danger of injury and/or property damage, this alone cannot be relied upon to ensure complete safety. Until the integrated monitoring functions become effective, it must be assumed in any case that faulty drive movements will occur. The extent of faulty drive movements depends upon the type of control and the state of operation.

Dangerous movements! Danger to life, risk of injury, serious injury or property damage!

A **risk assessment** must be prepared for the installation or machine, with its specific conditions, in which the components of the electric drive and control system are installed.

As a result of the risk assessment, the user must provide for monitoring functions and higher-level measures on the installation side for personal safety. The safety regulations applicable to the installation or machine must be taken into consideration. Unintended machine movements or other malfunctions are possible if safety devices are disabled, bypassed or not activated.

To avoid accidents, injury and/or property damage:

- Keep free and clear of the machine's range of motion and moving machine parts. Prevent personnel from accidentally entering the machine's range of motion by using, for example:
  - Safety fences
  - Safety guards
  - Protective coverings
  - Light barriers
- Make sure the safety fences and protective coverings are strong enough to resist maximum possible kinetic energy.
- Mount emergency stopping switches in the immediate reach of the operator. Before commissioning, verify that the emergency stopping equipment works. Do not operate the machine if the emergency stopping switch is not working.
- Prevent unintended start-up. Isolate the drive power connection by means of OFF switches/OFF buttons or use a safe starting lockout.
- Make sure that the drives are brought to safe standstill before accessing or entering the danger zone.
- Additionally secure vertical axes against falling or dropping after switching off the motor power by, for example,
  - mechanically securing the vertical axes,
  - adding an external braking/arrester/clamping mechanism or
  - ensuring sufficient counterbalancing of the vertical axes.
- The standard equipment **motor holding brake** or an external holding brake controlled by the drive controller is **not sufficient to guarantee personal safety**!
- Disconnect electrical power to the components of the electric drive and control system using the master switch and secure them from reconnection ("lock out") for:
  - Maintenance and repair work
  - Cleaning of equipment
  - Long periods of discontinued equipment use
- Prevent the operation of high-frequency, remote control and radio equipment near components of the electric drive and control system and their supply leads. If the use of these devices cannot be avoided, check the machine or installation, at initial commissioning of the electric drive and control system, for possible malfunctions when operating such high-frequency, remote control and radio equipment in its possible positions of normal use. It might possibly be necessary to perform a special electromagnetic compatibility (EMC) test.

3.3.4 Protection Against Magnetic and Electromagnetic Fields During Operation and Mounting

Magnetic and electromagnetic fields generated by current-carrying conductors or permanent magnets of electric motors represent a serious danger to persons with heart pacemakers, metal implants and hearing aids.

Health hazard for persons with heart pacemakers, metal implants and hearing aids in proximity to electric components!

- Persons with heart pacemakers and metal implants are not allowed to enter the following areas:
  - Areas in which components of the electric drive and control systems are mounted, commissioned and operated.
  - Areas in which parts of motors with permanent magnets are stored, repaired or mounted.
- If it is necessary for somebody with a heart pacemaker to enter such an area, a doctor must be consulted prior to doing so. The noise immunity of implanted heart pacemakers differs so greatly that no general rules can be given.
- Those with metal implants or metal pieces, as well as with hearing aids, must consult a doctor before they enter the areas described above.

3.3.5 Protection Against Contact With Hot Parts

Hot surfaces of components of the electric drive and control system. Risk of burns!

- Do not touch hot surfaces of, for example, braking resistors, heat sinks, supply units and drive controllers, motors, windings and laminated cores!
- According to the operating conditions, temperatures of the surfaces can be **higher than 60 °C** (140 °F) during or after operation.
- Before touching motors after having switched them off, let them cool down for a sufficient period of time. Cooling down can require **up to 140 minutes**! The time required for cooling down is approximately five times the thermal time constant specified in the technical data.
- After switching chokes, supply units and drive controllers off, wait **15 minutes** to allow them to cool down before touching them.
- Wear safety gloves or do not work at hot surfaces.
- For certain applications, and in accordance with the respective safety regulations, the manufacturer of the machine or installation must take measures to avoid injuries caused by burns in the final application. These measures can be, for example: Warnings at the machine or installation, guards (shieldings or barriers) or safety instructions in the application documentation.

3.3.6 Protection During Handling and Mounting

Risk of injury by improper handling! Injury by crushing, shearing, cutting, hitting!

- Observe the relevant statutory regulations of accident prevention.
- Use suitable equipment for mounting and transport.
- Avoid jamming and crushing by appropriate measures.

- Always use suitable tools. Use special tools if specified.
- Use lifting equipment and tools in the correct manner.
- Use suitable protective equipment (hard hat, safety goggles, safety shoes, safety gloves, for example).
- Do not stand under hanging loads.
- Immediately clean up any spilled liquids from the floor due to the risk of slipping.

3.3.7 Battery Safety

Batteries consist of active chemicals in a solid housing. Therefore, improper handling can cause injury or property damage.

Risk of injury by improper handling!

- Do not attempt to reactivate low batteries by heating or other methods (risk of explosion and cauterization).
- Do not attempt to recharge the batteries as this may cause leakage or explosion.
- Do not throw batteries into open flames.
- Do not dismantle batteries.
- When replacing the battery/batteries, do not damage the electrical parts installed in the devices.
- Only use the battery types specified for the product.

☞ Environmental protection and disposal! The batteries contained in the product are considered dangerous goods during land, air, and sea transport (risk of explosion) in the sense of the legal regulations. Dispose of used batteries separately from other waste. Observe the national regulations of your country.

3.3.8 Protection Against Pressurized Systems

According to the information given in the Project Planning Manuals, motors and components cooled with liquids and compressed air can be partially supplied with externally fed, pressurized media, such as compressed air, hydraulics oil, cooling liquids and cooling lubricants. Improper handling of the connected supply systems, supply lines or connections can cause injuries or property damage.

Risk of injury by improper handling of pressurized lines!

- Do not attempt to disconnect, open or cut pressurized lines (risk of explosion).
- Observe the respective manufacturer's operating instructions.
- Before dismounting lines, relieve pressure and empty medium.
- Use suitable protective equipment (safety goggles, safety shoes, safety gloves, for example).
- Immediately clean up any spilled liquids from the floor due to the risk of slipping.

☞ Environmental protection and disposal! The agents (e.g., fluids) used to operate the product might not be environmentally friendly. Dispose of agents harmful to the environment separately from other waste. Observe the national regulations of your country.

3.4 Explanation of Signal Words and the Safety Alert Symbol

The Safety Instructions in the available application documentation contain specific signal words (DANGER, WARNING, CAUTION or NOTICE) and, where required, a safety alert symbol (in accordance with ANSI Z535.6-2006).

The signal word is meant to draw the reader's attention to the safety instruction and identifies the hazard severity.

The safety alert symbol (a triangle with an exclamation point), which precedes the signal words DANGER, WARNING and CAUTION, is used to alert the reader to personal injury hazards.

⚠ DANGER

In case of non-compliance with this safety instruction, death or serious injury **will** occur.

⚠ WARNING

In case of non-compliance with this safety instruction, death or serious injury **could** occur.

⚠ CAUTION

In case of non-compliance with this safety instruction, minor or moderate injury could occur.

NOTICE

In case of non-compliance with this safety instruction, property damage could occur.

4 Technical Data

4.1 PC Box

PC box	Type C	Type A
Processor	Celeron-M, 1.3 GHz Pentium-M 1.8 GHz and integrated graphics controller with a maximum of 8 MB video memory	
RAM	512 MB 1 GB	
Hard disk	Min. 30 GB, mounted within a vibration-resistant suspension	
Optional drives	DVD ROM or DVD ROM / CD RW	
Interfaces	• 1 × display interface (25-pin, D-Sub) • 1 × parallel interface (25-pin, D-Sub) • 1 x external VGA connection (15-pin, HD-Sub) • 2 × USB connection (type A) • 1 × Ethernet connection (RJ 45, 10/100 base-T) • 1 × keyboard connection (PS/2) • 1 × mouse connection (PS/2) • 1 x external battery connection • 3 x serial standard interfaces RS232 (9-pin, D-Sub)[1)] • 1 × RS422 interface (9-pin, D-Sub)	
Slots	3 × PCI, 1 × PCI / ISA	2 × PCI, 1 × PCI / ISA
Degree of protection	PC box: IP 20	
Voltage supply	AC 85 V to AC 264 V or DC 24 V	
Max. power consumption	200 W	
Weight	without CD-ROM 6.1 kg with CD-ROM + 0.2 kg additionally for 4th slot + 0.1 kg additionally	

Fig.4-1: Technical data of the PC box

4.2 Power Supply Unit 115 V / 230 V

Nominal input voltage	AC 115 V or AC 230 V
Input voltage range	AC 85 V... AC 264 V
Input current	1.0 A for nominal voltage AC 230 V 2.0 A for nominal voltage AC 115 V

1) For connected display: two serial interfaces

Technical Data

Max. inrush current (cold start 25 °C)	40 A for nominal voltage AC 230 V 20 A for nominal voltage AC 115 V	
Output voltages +5 V +12 V -12 V +20 V ISO 6 V	Current (max.) 20 A 3 A 500 mA 2 A 200 mA	Tolerance (incl. residual ripple) ±5 % ±5 % ±5 % ±5 % ±5 %
Maximum output power	160 W	
Efficiency	0.8	

Fig.4-2: Technical data of the power supply unit 115 V / 230 V

NOTICE

The control cabinet PC VPB 40.1 can be damaged if the power supply unit is switched off if the total output power exceeds 160 W.

When maximum output currents are specified, please observe that the currents are the maximum possible currents for the respective output voltage. However, it is not possible to produce the maximum current from all output voltages, as the maximum total output power of 160 W must not be exceeded.

4.3 24 V Voltage Supply

Nominal input voltage	DC 24 V	
Input voltage range	DC 24 V +20 %, -15 %	
Emitted interference and surge immunity	U_{max} = 35 V (for t < 100 ms)	
Max. input current	6 A for nominal voltage 24 V	
Max. inrush current	25 A for nominal voltage 24 V	
Output voltages +5 V +12 V +24 V -12 V ISO 6 V	Current (max.) 13 A 3 A 2 A 500 mA 200 mA	Tolerance (incl. residual ripple) ±5 % ±5 % ±5 % ±5 % ±5 %
Max. output power	110 W	
Efficiency	0.8	

Fig.4-3: Technical data of the 24 V power supply unit

NOTICE **The control cabinet PC VPB 40.1 can be damaged if the power supply unit is switched off if the total output power exceeds 110 W.**

When maximum output currents are specified, please observe that the currents are the maximum possible currents for the respective output voltage. However, it is not possible to produce the maximum current from all output voltages at the same time, as the maximum total output power (= max. 110 W) must not be exceeded.

4.4 Ambient Conditions

	In operation	Storage / Transport
Max. surrounding air temperature	+5 °C ... +45 °C	-20 °C to +60 °C
Max. temperature gradient	Temporal temperature changes up to 3 °C per minute	Not defined
Relative humidity	Climatic class 3K3 according to EN 60721, non-condensing.	Climatic class 3K3 according to EN 60721, non-condensing.
Air pressure	Up to 2000 m above MSL according to DIN 60204	
Mechanical strength	Max. vibration: Frequency range: 10 to 150 Hz Excursion: 0.075 mm for 10 ... 57 Hz Acceleration: 1 g for 57 to 150 Hz acc. to EN 60068-2-6	Max. shock: 15 g acc. to DIN IEC 68-2-27, No breakdown of the function
Degree of pollution	2	2

Fig.4-4: Ambient conditions

4.5 Used Standards

The system components of the VPB 40.1 correspond to the following standards:

Standard	Meaning
EN 60 204-1	Electrical equipment of machines
EN 50 081-2	Generic standards - emission standard (industrial environments)
EN 50 082-2	Generic standards - noise immunity (industrial environments)
EN 60 742	Transformer for 24 V power supply unit, protective separation
EN 60 950	Overvoltage category II
EN 61 131	24 V outputs requirements
EN 61 131-2	24 V current supply requirements
EN 418	Safety of machinery, emergency stop devices

Standard	Meaning
EN 60 529	Degrees of protection (including housings and installation compartments)
EN 60 068-2-6	Vibration test
EN 60 068-2-27	Shock test

Fig.4-5: Used standards

4.6 CE Marking

4.6.1 Declaration of Conformity

CE

The electronic products described in the project planning manual comply with the requirements and goals of the following EC guideline and with the agreed European standards:

EMC guideline 2004/108/EC

The electronic products described in the project planning manual comply with the requirements on the operation within the industrial environment:

Standard	Title	Edition
DIN EN 61000-6-4 (VDE 0839-6-4)	Electromagnetic compatibility (EMC) Volume: 6-4: Generic standards - emitted interference for industrial environments (IEC 61000-6-4:2006)	September 2007
DIN EN 61000-6-2 (VDE 0839-6-2)	Electromagnetic compatibility (EMC) Volume: 6-2: Generic standards – noise immunity for industrial environments (IEC 61000-6-2:2005)	March 2006

Fig.4-6: Electromagnetic compatibility (EMC) standards

4.6.2 Note for the Machine Manufacturer

The electronic products described in this project planning manual do not fall under the machines listed in the EC guidelines. Therefore, explanations are not required for the 89/392/EMC guideline and do not exist.

89/392/EMC, the EC guideline for machines, specifies the requirements on a machine. In this guideline, a machine is defined as a combination of the components or mechanisms combined with each other. The described products belong to the electrical equipment of a machine. Therefore, they are to be included in the declaration of conformity of the machine manufacturer.

The standard EN 60204-1 (safety of machinery, general requirements on the electrical equipment of the machines) can be used for the electrical equipment of the machines.

NOTICE **Loss of CE conformity due to modifications of the device.**

The CE marking is only valid for the device in its delivery status. After modifying the device, the CE conformity is to be verified.

4.7 UL/CSA Certified

The devices of the IndraControl VPB 40.1 family are certificated according to

- **UL508** (Industrial Control Equipment) and
- **C22.2 no. 142-M1987** (CSA)

UL file no. E210730

However, there can be combinations or extension stages with limited or missing certification. Thus, verify the certification by using the UL marking on the device.

To guarantee an UL/CSA-compliant operation, the following conditions have to be fulfilled:

- Use only insulated copper wire suitable for at least 60/75 °C.

NOTICE **Loss of UL/CSA compliance due to changes on the device.**

The UL/CSA marking is only valid for the device in its delivery status (ex works). After having modified the device the UL/CSA compliance must be verified.

4.8 Wear Parts

Wear parts without warranty:

CMOS battery The service life of a CMOS battery is at least five years. To exchange this battery, please contact the Bosch Rexroth Service.

Battery The number of charging cycles of the battery pack and thus, its service life is dependent on the surrounding air temperature, in which the battery pack is used. Surrounding air temperature is defined as the temperature, in which the control cabinet PC or the battery pack is situated, e.g. the internal temperature of the control cabinet or in a operator panel housing.

Surrounding air temperature	Maintenance interval
25 °C	10 years
35 °C	5 years
45 °C	2.5 years

Fig.4-7: Battery pack: Maintenance interval: external battery pack for top-hat rail mounting and for screw mounting

If you do not know exactly the conditions, Bosch Rexroth recommends you to exchange the battery pack every 1.5 years.

Hard disk The hard disk is an electromechanical component that is subject to wear during the operating time. According to the manufacturer's data the hard disk has been developed for a service life of 60 months in consideration of the following conditions:

Operating hours / month	Max. 333
Input/output cycles / month	Min. 10 and max. 150

Technical Data

Operating conditions	Temperature	40 °C
	Relative humidity	30 %
	Height	< 500 m
	Accesses	30 % of the operating hours
Storage conditions	Temperature	< 30 °C
	Relative humidity	< 70 %
	Duration	< 3 months

Fig.4-8: Typical operating and storage conditions of the hard disk

The operation out of this typical conditions is permissible, whereby, however, the service life of the hard disk may reduce. The ambient conditions specified for the overall device (see fig. 4-4 "Ambient conditions" on page 21) must be observed.

Fan

Fans are mechanic wear components, whose service life is extremely temperature-dependent. For the fan integrated in the housing, the following service life is specified by the manufacturer:

Surrounding air temperature	Service life
40 °C	70 000 hours
70 °C	35 000 Stunden

Fig.4-9: Service life of the fan

4.9 Compatibility Test

All Rexroth controls and drives are developed and tested according to the latest state-of-the-art of technology.

As it is impossible to follow the continuing development of all materials (e. g. lubricants in machine tools) which may interact with our controls and drives, it cannot be completely ruled out that any reactions with the materials used by Bosch Rexroth might occur.

For this reason, before using the respective material a compatibility test has to be carried out for new lubricants, cleaning agents etc. and our housings / our housing materials.

5 Dimensions, Installation

5.1 General Information

All values are given in mm.

5.2 Housing Dimensions

The VPB 40.1 can be mounted, e. g. in the control cabinet with the help of four fastening holes. For the corresponding dimensions, please refer to figures fig. 5-1 "Horizontal mounting of the VPB 40.1 (device with 3-slot box)" on page 25 and fig. 5-5 "VPB 40.1 dimensions (top view)" on page 27.

The VPB 40.1 can be mounted horizontally (net connection on the left side) as well as vertically (net connection on the top).

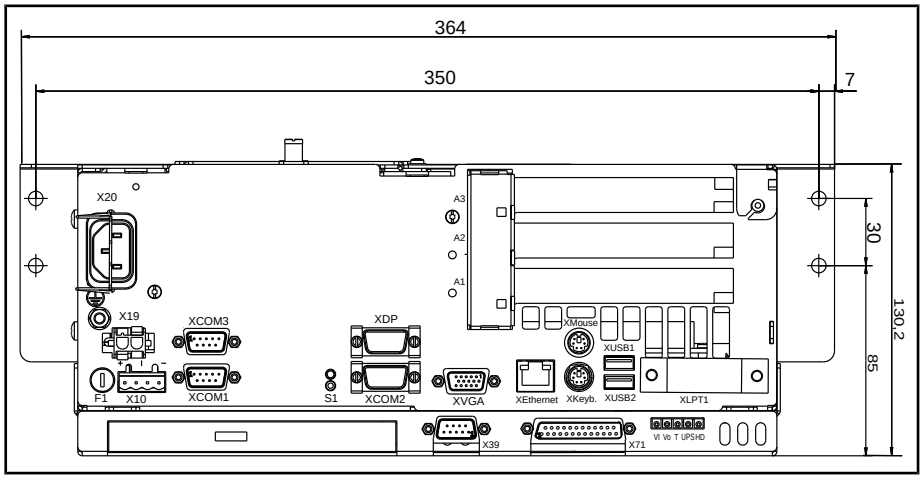


Fig.5-1: Horizontal mounting of the VPB 40.1 (device with 3-slot box)

The height of the VPB 40.1 depends on the number of slots of the used PC box:

PC box	Number of slots	VPB 40.1 height
Type A	3	130.2 mm (plus 10 mm for the screw of the hard disk cover)
Type C	4	150.5 mm (plus 10 mm for the screw of the hard disk cover)

Fig.5-2: VPB 40.1 height

Dimensions, Installation

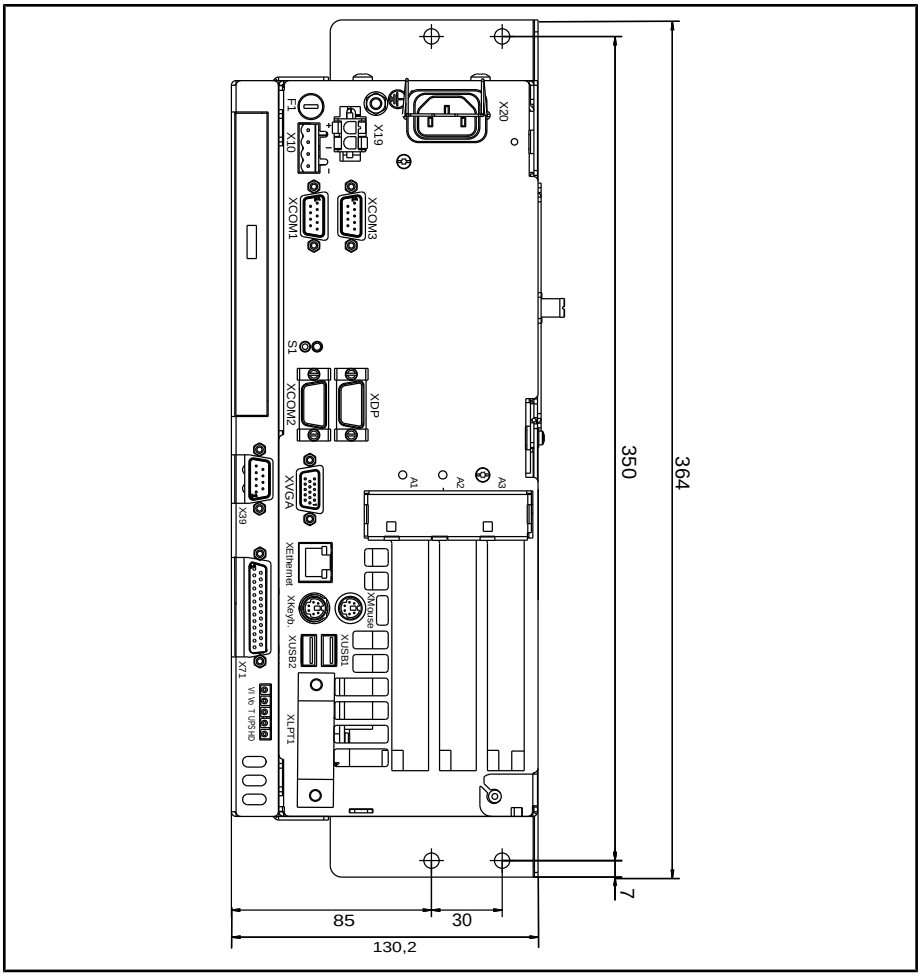


Fig.5-3: Vertical mounting of the VPB 40.1 (device with 3-slot box)

The width of the VPB 40.1 depends on the number of slots of the used PC box:

PC box	Number of slots	VPB 40.1 width
Type A	3	130.2 mm (plus 10 mm for the screw of the hard disk cover)
Type C	4	150.5 mm (plus 10 mm for the screw of the hard disk cover)

Fig.5-4: VPB 40.1 width

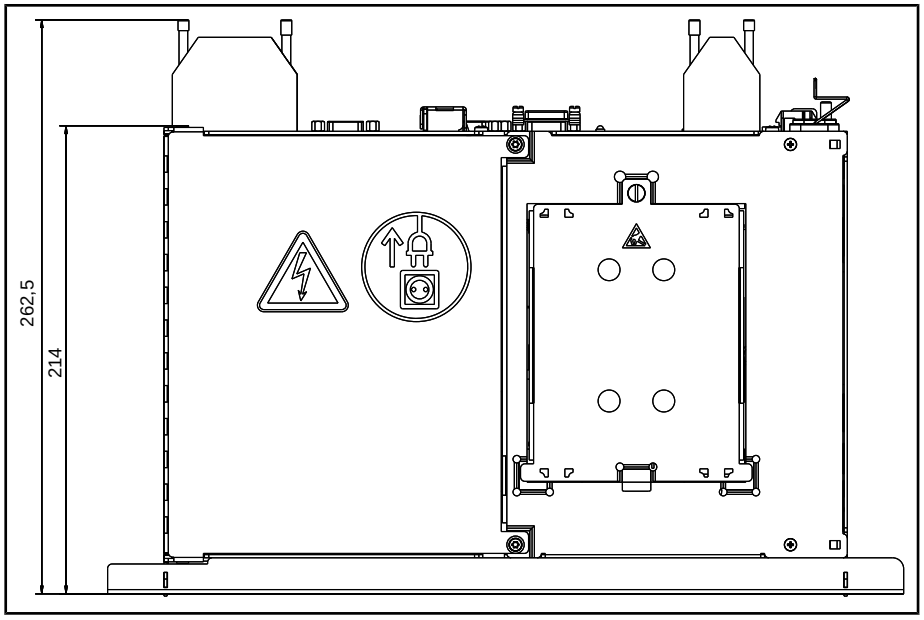


Fig.5-5: VPB 40.1 dimensions (top view)

5.3 Installation Notes

- Avoid installation locations exposed to direct sunlight/UV-light because this causes additional heat development.
- Install the control cabinet PC in a way ensuring easy access to the connector panel.
- Provide a sufficient space of 50 mm (on all sides of the device) for sufficient cooling and cable routing.
- Lay all connecting cables in loops and use strain reliefs for all cables.
- Keep as much distance as possible to noise sources.

Minimum distances for cooling, cables, DVD drive and maintenance

For cooling, cables, maintenance and the DVD drive the following minimum distances must be observed as shown in the following figures:

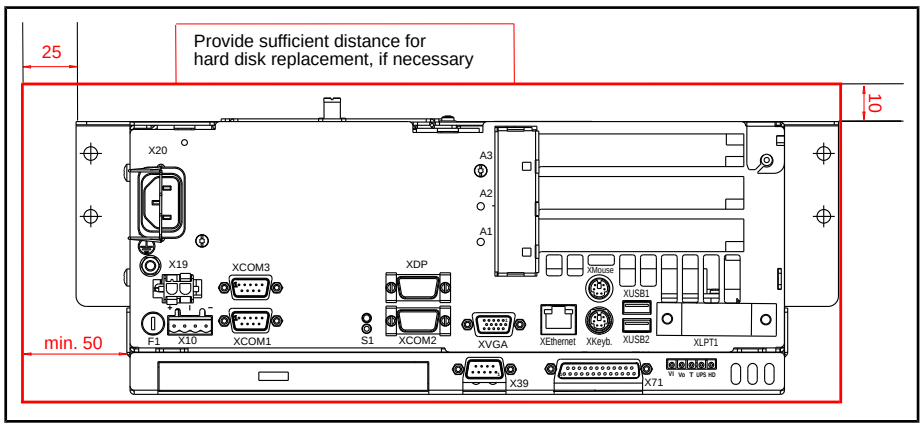


Fig.5-6: Minimum distances for cooling, cables, DVD drive and maintenance: Front View

Dimensions, Installation

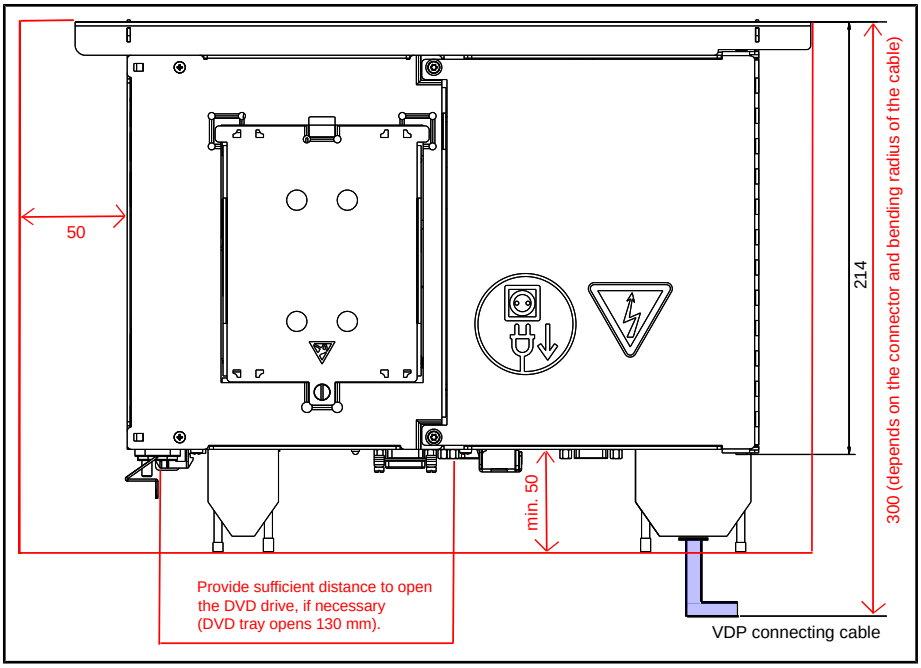

50
214
300 (depends on the connector and bending radius of the cable)
min. 50
Provide sufficient distance to open
the DVD drive, if necessary
(DVD tray opens 130 mm).
VDP connecting cable

Fig.5-7: Minimum distances for cooling, cables, DVD drive and maintenance: Top view

6 Display and Operating Components

6.1 Monitor and Keyboard

Displays with foil keyboard and touch screen

To display and operate the VPB 40.1 we recommend the displays VDP 16, VDP 40 and VDP 60 especially designed by Bosch Rexroth for industrial applications. The displays are connected with the VPB 40.1 via the G5 display interface. These displays are equipped either with a keypad or with a touch screen with varying display size.

☞ For detailed information, please refer to the relevant documentation.

Connection monitor

A standard monitor (female connector XVGA), a PS2 keyboard (female connector XKeyb.) and a PS2 mouse (female connector XMouse) can be also connected with the VPB 40.1. Please observe that most of the standard mice and keyboards are not suitable for the industrial environment and are very susceptible to electromagnetic disturbances.

NOTICE **The VPB 40.1 control cabinet PC cannot be operated if keyboard and mouse are connected to the VPB 40.1 if a VDP display is used.**

If a VDP is used, keyboard and mouse may only be connected to this display. Don't use the keyboard and mouse interfaces at the VPB 40.1.

6.2 Operating and Error Display

In the lower right part of the connector panel there are five LEDs to display the device states and errors. Apply the specified measure if one of the following LEDs display either an error or a note.

LEDs for operating and error display

LED	Display	Meaning	Measure
Vi	LED green	Normal mode	-
	LED off	No supply voltage AC 230 V/115 V or DC 24 V	Check the supply voltage at the power supply unit!
Vo	LED green	Normal mode	-
	LED off	Internal 5 V supply faulty!	-
T	LED off	Normal mode	
	LED flashes yellow	Overtemperature	Reduce surrounding air temperature! Check fan on the control cabinet PC!

Display and Operating Components

LED	Display	Meaning	Measure
UPS	LED off	Normal mode	-
	LED red	VPB 40.1 is currently operating in battery mode, i. e. no voltage supply is available!	Restore power supply and initiate controlled restart!
	LED flashes red	Battery pack discharged, defective or not connected	Check battery! Maintain the charging time of 5 hours!
HDD	LED yellow	Hard disk access	-

Fig.6-1: LEDs to operating and error display on the connector panel

7 Connections

7.1 View on the Connector Panel

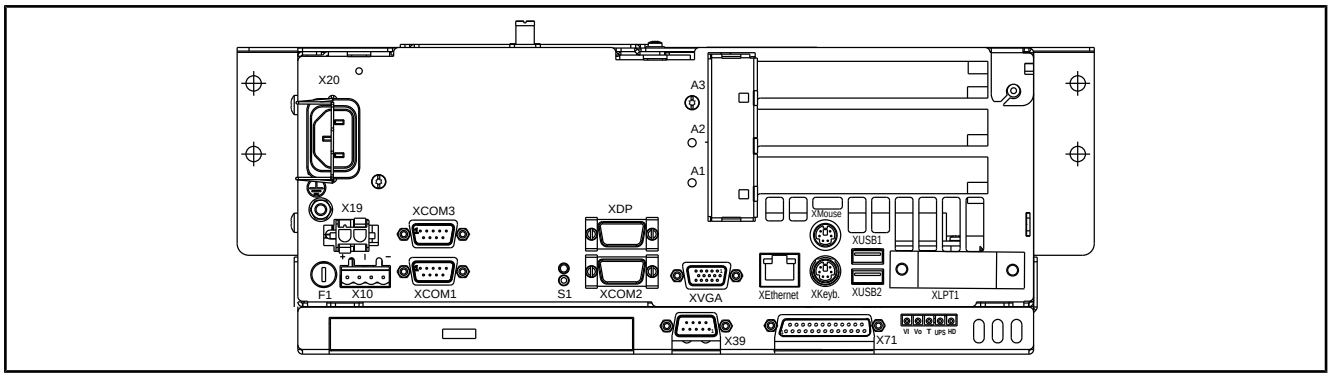


Fig.7-1: Position of the connections

7.2 Interfaces

7.2.1 General Information

Not each variant provides all the described interfaces. Which interfaces are integrated in the respective device depends on the device configuration.

NOTICE **Malfunctions due to insufficient shielding!**

Use only shielded cables and metallic, conductive connectors or coupling housings with large-area shield support.

7.2.2 Overview

Interfaces - Overview

Designation at the housing	Connection type	Connector type (integrated)	Mating connector or cable (from outside)
XCOM1, XCOM2, XCOM3	Serial interfaces: RS232 (UART 16550)	D-Sub male connector, 9-pin	D-Sub female connector, 9-pin
XLPT1	Parallel interface: supports standard SPP-, EPP-, ECP-mode	D-Sub female connector, 25-pin	D-Sub male connector, 25-pin (e. g. printer cable)
XUSB1, XUSB2	USB interfaces	USB female connector, 4-pin, type A	USB male connector, 4-pin
XEthernet	Network connection: Ethernet 10Base T / 100Base X	RJ45 female connector, 8-pin	RJ45 connector (twisted pair, 8-wire)
XVGA	VGA connection of an external monitor	VGA-HD female connector, 15-pin	VGA-HD male connector, 15-pin

Connections

Designation at the housing	Connection type	Connector type (integrated)	Mating connector or cable (from outside)
XKeyb.	PS/2 keyboard/mouse	Mini-DIN PS/2 female connector, 6-pin	Mini-DIN PS/2 male connector, 6-pin
XMouse	PS/2 mouse	Mini-DIN PS/2 female connector, 6-pin	Mini-DIN PS/2 male connector, 6-pin
X10	PC voltage supply: DC 24 V (alternative to X20)	Male connector terminal, MSTB 1.5, 4-pin	Female connector terminal, MSTB 1.5, 4-pin
X19	Battery for uninterruptible power supply (UPS)	Tyco/AMP MATE-N-LOK, 2-pin	Cable to the battery of the UPS
X20	PC voltage supply: AC 230 V/115 V	AC male connector	AC female connector
X39 or X43	Serial RS422 interface	D-Sub connector, 9-pin	D-Sub female connector, 9-pin
Display interfaces			
X71	G4 display interface (for VDP 16, VDP 40 or VDP 60)	D-Sub female connector, 25-pin	D-Sub male connector, 25-pin
or			
X71	G5 display interface (for VDP 16 or VDP 40)	D-Sub female connector, 25-pin	D-Sub male connector, 25-pin

Fig.7-2: VPB 40.1 interfaces

7.2.3 Serial Interfaces XCOM1 to XCOM3

XCOM1 to XCOM3 – Serial Interfaces

Depending on the device variant up to three serial standard interfaces are available at the connections XCOM1 to XCOM3.

D-Sub connector, 9-pin			
Type	RS232		
Cable length	15 m max.		
Cable type	Shielded, cross-section min. 0.14 mm^2		
Transmission rate	Max. 115200 bits/s		
Handshake	Hardware and software handshake (XON, XOFF)		
	XCOM1	**XCOM2**	**XCOM3**
Interrupt (IRQ)	4	3	11
I/O address	3F8H	2F8H	3E8H
BIOS presetting	Enabled	Enabled	Enabled

Fig.7-3: Serial interfaces - XCOM1 to XCOM3

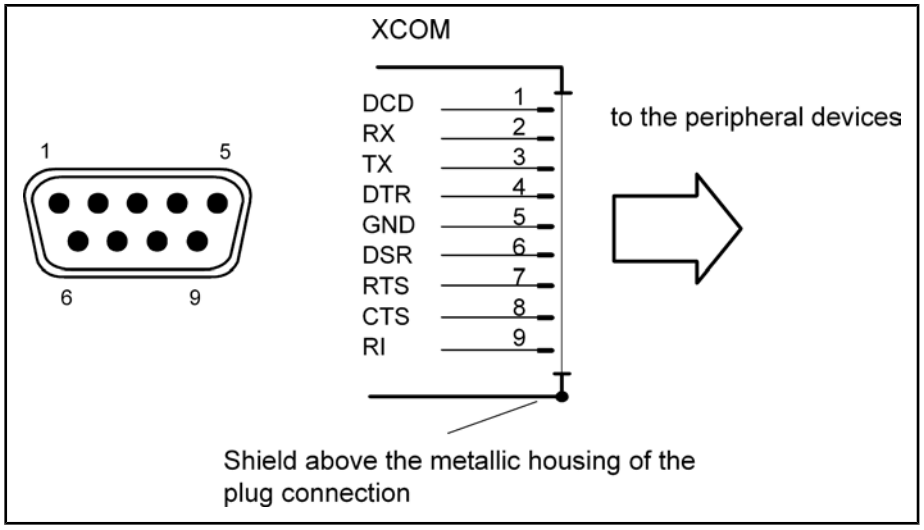


Fig.7-4: Pin assignment XCOM1 to XCOM3

NOTICE

A safe function of a device connected to a COM interface is not possible if the COM interface is already used internally.

A safe function of a device connected to a COM interface is only possible if the COM interface is not used internally. Depending on the variant and the used software packages, the interfaces can already be occuppied.

7.2.4 Serial Interfaces, Settings

Control panel

To find out settings of the transfer parameters for the serial interfaces please refer to the description of the installed operating system. In Windows XP under **Start Settings Control panel Device manager**.

BIOS

The BIOS settings of the serial interfaces are:

Interface	BIOS setting
COM1	3F8H
COM2	2F8H
COM3	3E8H
COM4	2E8H

Fig.7-5: BIOS settings

NOTICE

A safe function of a device connected to a COM interface is not possible if Interrupt or I/O address conflicts arise.

Interrupt (IRQ) and I/O address have to correspond to the settings carried out in BIOS.

If an address conflict regarding COM3 occurs, e. g., IRQ 11 is already occupied by other extension cards of the PC, free IRQs have to be used.

RS232 interface for IndraControl VPB 40.1

A new motherboard is used for the the IndraControl devices VPB and VPP type 1 devices. Due to the new motherboard, serial RS232 components may not function correctly. The reason for this is a change of Interrupt 10 and 11 of the serial COM interfaces in the serial COM ports 3 and 4. For troubleshooting

adjust the values of the COM interfaces in the BIOS. Alternatively, the IRQ can also be adjusted via the configuration software of the serial device.

BIOS setting since Q1/2007		**BIOS setting until Q1/2007**	
Menu: I/O Device Configuration		Menu: Integrated Peripherals	
Serial port C (COM 3):	[Enabled]	Onboard Serial Port 3:	[3E8/**IRQ11**]
Base I/O address:	[3E8]		
Interrupt:	[**IRQ 10**]		
Serial port D (COM 4):	[Enabled]	Onboard Serial Port 4:	[2E8/**IRQ10**]
Base I/O address:	[2E8]		
Interrupt:	[**IRQ 11**]		

Fig.7-6: BIOS settings of the COM interfaces

For any questions, please contact your service/sales person or the help desk +49 (0) 9352 / 40 50 60, see also chapter 12 "Service and Support" on page 77.

7.2.5 Parallel Interface XLPT1

XLPT1 – Parallel interface for printer, scanner, etc.

D-Sub female connector, 25-pin	
Type:	SPP (ex works), EPP, ECP
Cable length:	3 m max.
Cable type:	Shielded, cross-section min. 0.14 mm^2
Interrupt (IRQ):	7
I/O address:	378H

Fig.7-7: Parallel interface - XLPT1

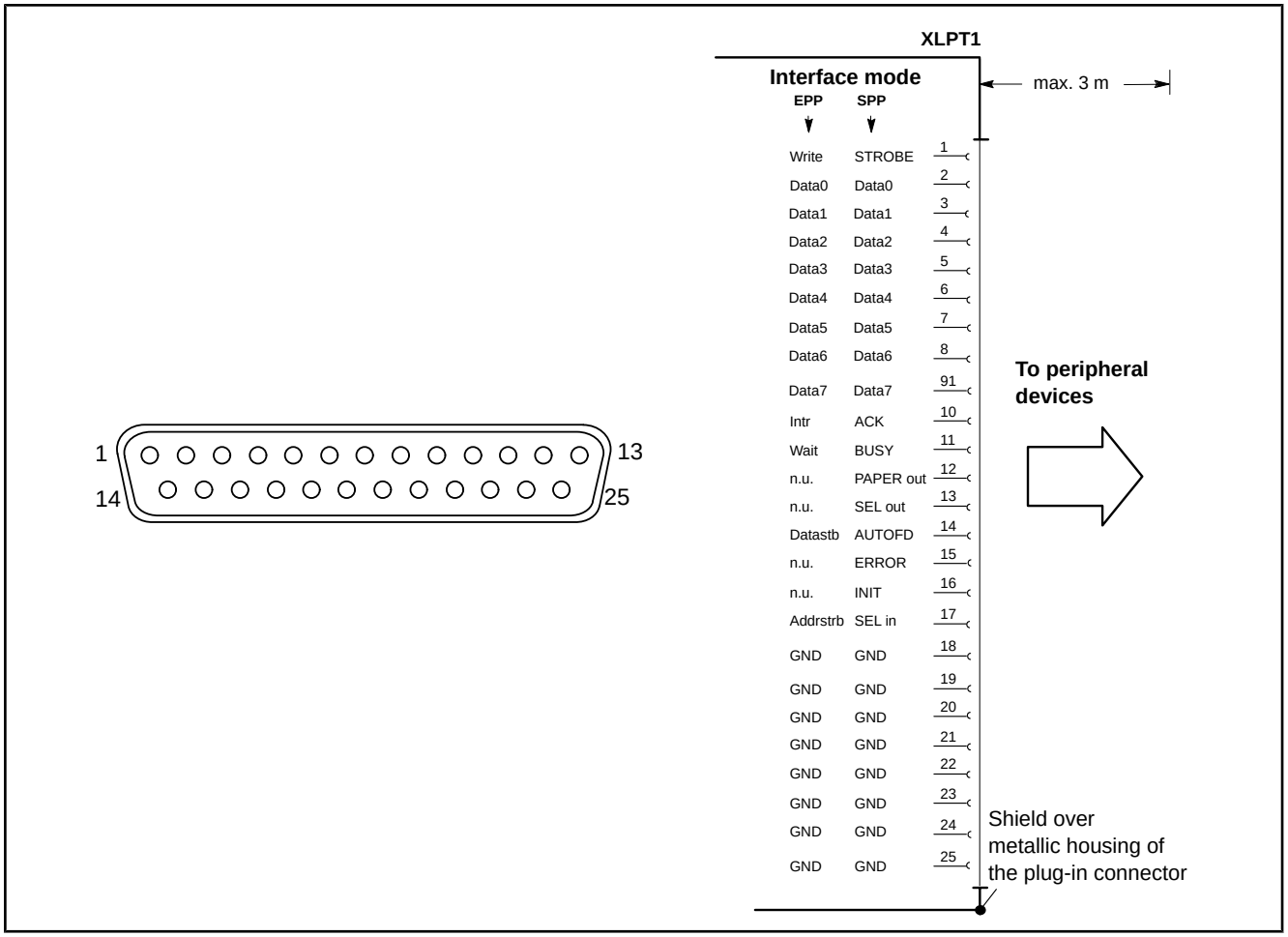


Fig.7-8: XLPT1 interface

The parallel interface normally runs in the standard mode SPP. The parallel interface can be operated also in the EPP-Mode (**E**nhanced **P**arallel **P**ort) or in the ECP-Mode (**E**xtended **C**apabilities **P**ort) if adequate peripheral components are available. The mode can be changed in the BIOS settings.

7.2.6 USB Interfaces XUSB

XUSB – serial interfaces for printer, scanner, CD-ROM drive

The devices feature two USB interfaces on the connector panel (XUSB1 and XUSB2) and one in the device (on the carrier board).

NOTICE **A connected USB device does not function if the current consumption exceeds 500 mA.**

The maximum power consumption of the connected device must not exceed 500 mA per USB connector. If the load exceeds 500 mA, the internal current monitoring is activated.

Connections

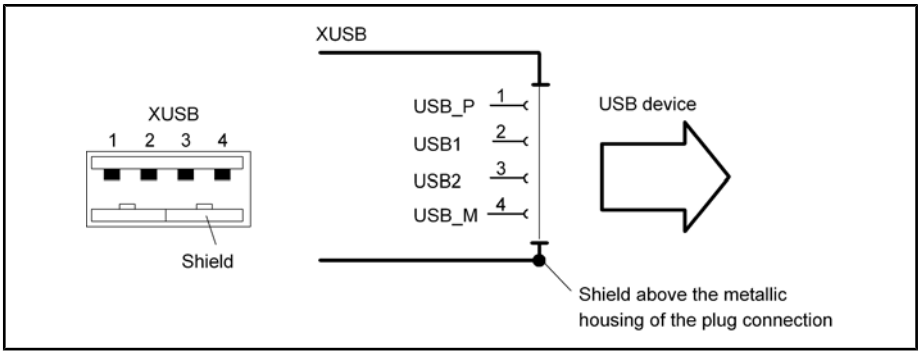


Fig.7-9: USB interfaces XUSB1 and XUSB2

Pin	Function
1	USB power supply (max. 500 mA)
2	Data -
3	Data +
4	USB ground

Fig.7-10: USB interfaces - XUSB1 and XUSB2

7.2.7 Ethernet Interface XEthernet

XEthernet – Network Connection

The VPB 40.1 can be connected to an Ethernet network via the XEthernet interface.

RJ45, female connector, 8-pin	
Type:	Ethernet 10Base T / 100Base X
Cable length:	100 m max.
Cable type:	Shielded, twisted pair
Transmission rate:	10 or 100 MBit/s

Fig.7-11: Ethernet interface - XEthernet

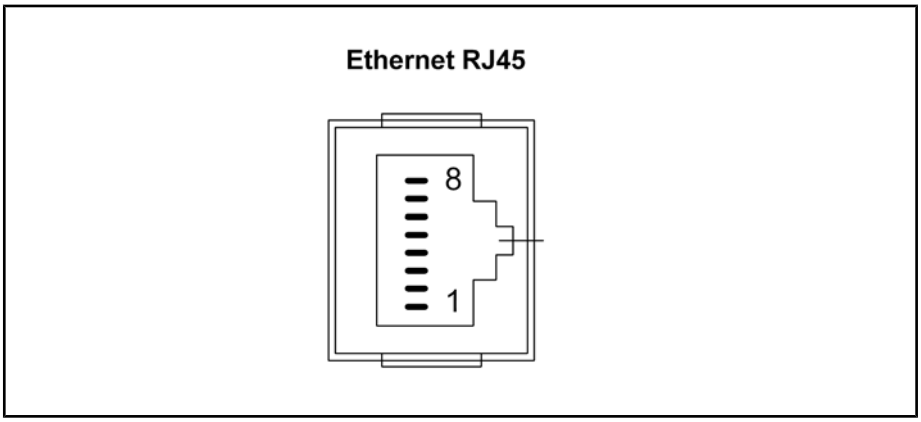


Fig.7-12: Ethernet interface XEthernet

The driver configuration of the network connection can be called up in the task bar or in the "Control Panel" with the "Network board" icon. Here you can set among other values, if the data transmission shall occur with 10 Mbit/s or with 100 Mbits/s via the network.

NOTICE

No or incorrect network data transmission if the data rate is set manually!

Please note that the network card of the outstation has to be able to process the same data transmission rate.

7.2.8 VGA Interface XVGA

XVGA – Connection external monitor

An external monitor can be connected to the VGA connection (XVGA).

- Video RAM: max. 8 MB

NOTICE

No display of BIOS messages on the external monitor if the monitor has been connected first after switching on the VPB 40.1.

Please observe that the external monitor has to be already connected during the booting process of the VPB 40.1, as otherwise the VGA interface is not initialized by the BIOS.

NOTICE

No screen output via an additional graphics card if the internal graphics adapter is not switched off.

Before plugging-in a graphics card, the video adapter integrated in BIOS is to be switched off.

HD female connector, 15-pin	
Cable length:	1.5 m max.
Cable type:	Shielded, cross-section min. 0.14 mm^2
Max. resolution:	1600 x 1200 pixels, 4294 mill. colors max.

Fig.7-13: VGA inerface - XVGA

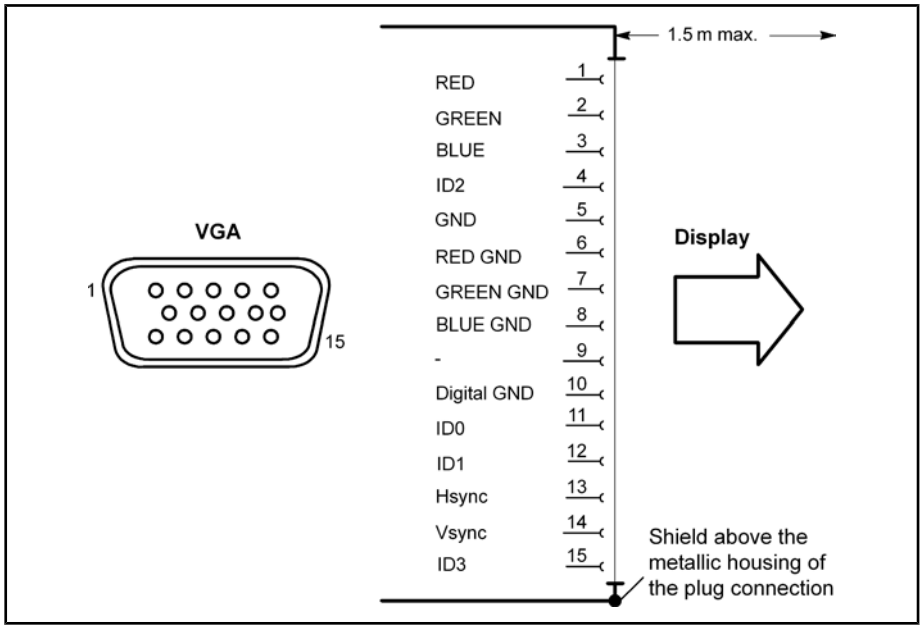


Fig.7-14: XVGA interface

Connections

Resolution

The following standard resolutions can be operated with an image refresh rate of at least 72 Hz.

- VGA mode: 640 × 480 pixels 32 bit colors
- SVGA mode: 800 × 600 pixels 32 bit colors
- XGA mode: 1024 × 768 pixels 32 bit colors
- SXGA mode: 1280 x 1024 pixels, 24 bit colors

The resolution and number of the colors are set in the control panel of the operating system.

⚠ WARNING **Setting incorrect resolutions and colors may destroy the monitor!**

Please note the technical data of the monitor and adapt the operating system parameters accordingly.

Recommended monitors for external use are low-radiation models according to TCO95. Additionally, you should achieve the desired display resolution with a refresh rate of at least 72 Hz.

7.2.9 Combined Keyboard/Mouse Interface XKeyb.

XKeyb. – PS/2 Mini DIN Keyboard / Mouse Interface

PS/2 Mini DIN female connector, 6-pin	
Cable length:	1.5 m max.
Cable type:	Shielded, cross-section min. 0.14 mm²

Fig.7-15: Combined keyboard/mouse interface - PS/2 Mini-DIN-connector

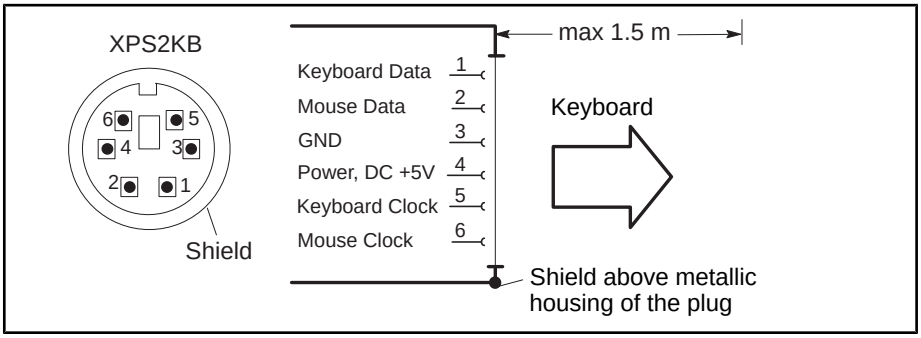


Fig.7-16: Combined keyboard/mouse interface XKeyb.

NOTICE **No mouse or keyboard entries are possible if a mouse or keyboard is plugged in the VPB 40.1 if a VDP is connected.**

If a BTT or VDP is connectd, keyboard and mouse may be connected only to this device and not to the VPB 40.1.

7.2.10 Mouse Interface XMouse

XMouse – PS/2 mouse interface

PS/2 Mini DIN female connector, 6-pin	
Cable length:	1.5 m max.
Cable type:	Shielded, cross-section min. 0.14 mm²

PS/2 Mini DIN female connector, 6-pin	
Interrupt (IRQ):	12
BIOS presetting:	PS/2 mouse support: EnabledPS/2 Mouse: Auto detect

Fig.7-17: Mouse interface - PS/2 mouse

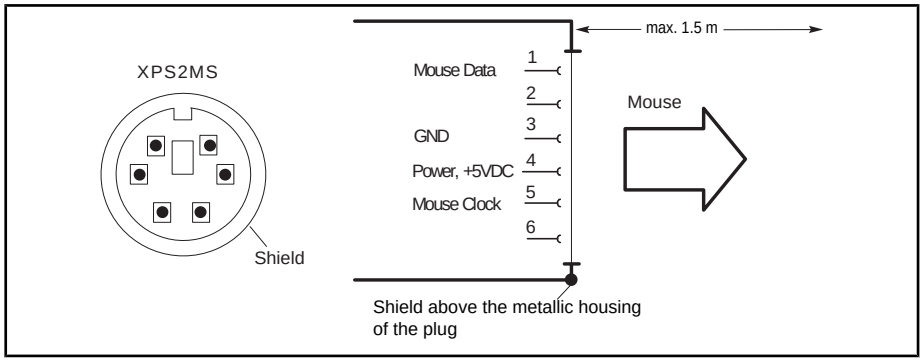


Fig.7-18: Mouse interface XMouse

If a PS/2 mouse is not recognized by the system, the mouse must be activated in the BIOS by switching from "Disabled" to "Autodetect". The operating system will not recognize the plugging-in of an external mouse after completed startup, because the mouse is initialized during the booting process.

NOTICE **Entries with a connected mouse are only possible if it is PS/2 compatible.**

The connected mouse must comply with the PS/2 standard. Normally, the BIOS reserves IRQ 12 for the PS/2 mouse If there are address conflicts, e. g., if IRQ 12 has already been used by another PC extension card, the IRQ of this extension card should be changed to unassigned IRQ.

NOTICE **Entries with a connected mouse are only possible if no other mouse is connected in parallel.**

If a keyboard with an integrated mouse is connected to the XKeby interface, no additional mouse must be connected to the mouse interface. The mouse integrated in the keyboard is available.

Connections

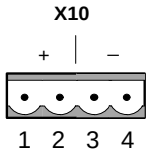
7.2.11 PC Voltage Supply X10, X20

X10 - DC 24 V voltage supply

This connection is used for device variants for DC 24 V. All internally required voltages are generated with electrical isolation via a DC/DC converter. The connection is designed as connector terminal MSTB 1.5, 4-pin. To this connector terminal, cables with a cross-section of maximum 1.5 mm^2 can be connected.

NOTICE **Destruction of screw terminals, insufficient contact and loss of UL/CSA certificiation if no copper wire is used and/or wrong tightening torque.**

For terminal connectors use copper wire only. Tighten the screws of the screw terminals with a torque of 5.5 lb in (0.6 Nm).



Pin	Assignment
1	24 V
2	24 V
3	0 V
4	0 V

Fig.7-19: DC 24 V connection, X10, pin assignment

Parameter	Value
Rated voltage U_N	DC 24 V ; +20 %, -15 %
Residual ripple at U_N	See fig. 7-22 "Limit values of the DC 24 V voltage" on page 41
Emitted interference and surge immunity	U_{max} = 35 V (for t < 100 ms)
Current consumption for U_N	4.8 A max.
Input fuse	M6, 3A (5x20) medium time-lag
Reverse voltage protection	Via decoupling diode The line-side fuse is activated when polarity reversal occurs.

Fig.7-20: DC 24 V connection, technical data

⚠ DANGER **Danger without protective separation!**

The DC 24 V input voltage must comply with the requirements of the "Protective separation"!

Plug and unplug the connector only if there is no voltage!

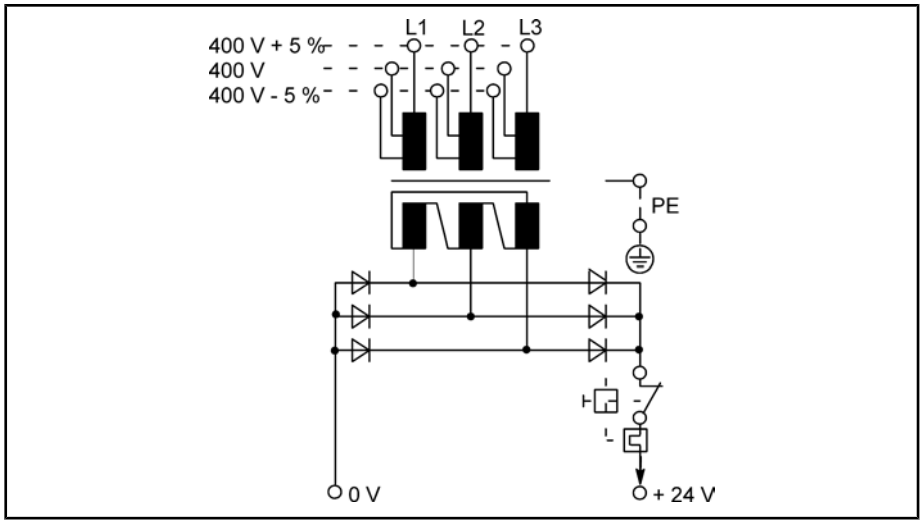


Fig.7-21: Safety transformer according to EN 60742

Interfering AC voltage components such as the ones resulting from an uncontrolled three-phase bridge circuit without smoothing and with a ripple factor (see DIN 40110/10.75, section 1.2) of 5 % are allowed.

That results in the greatest absolute value of 30.2 V as upper voltage limit. The lowest obsolete value of 18.5 V is the lower voltage limit.

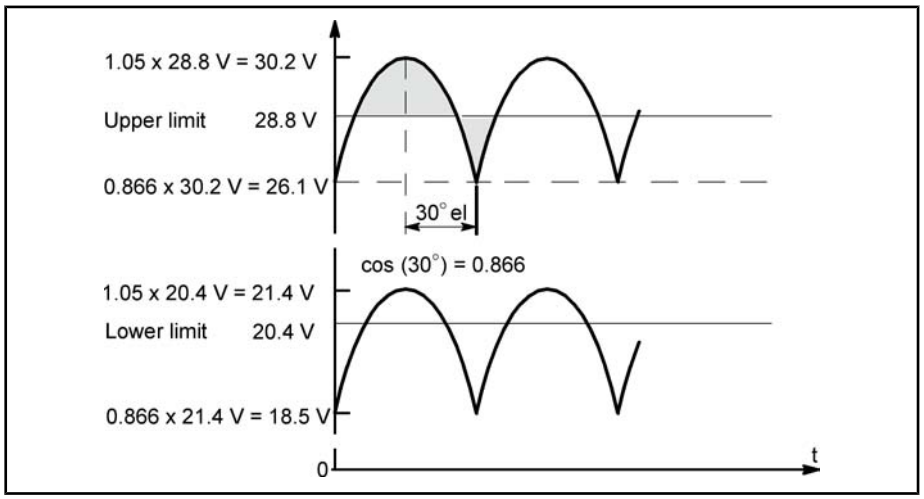


Fig.7-22: Limit values of the DC 24 V voltage

Connections

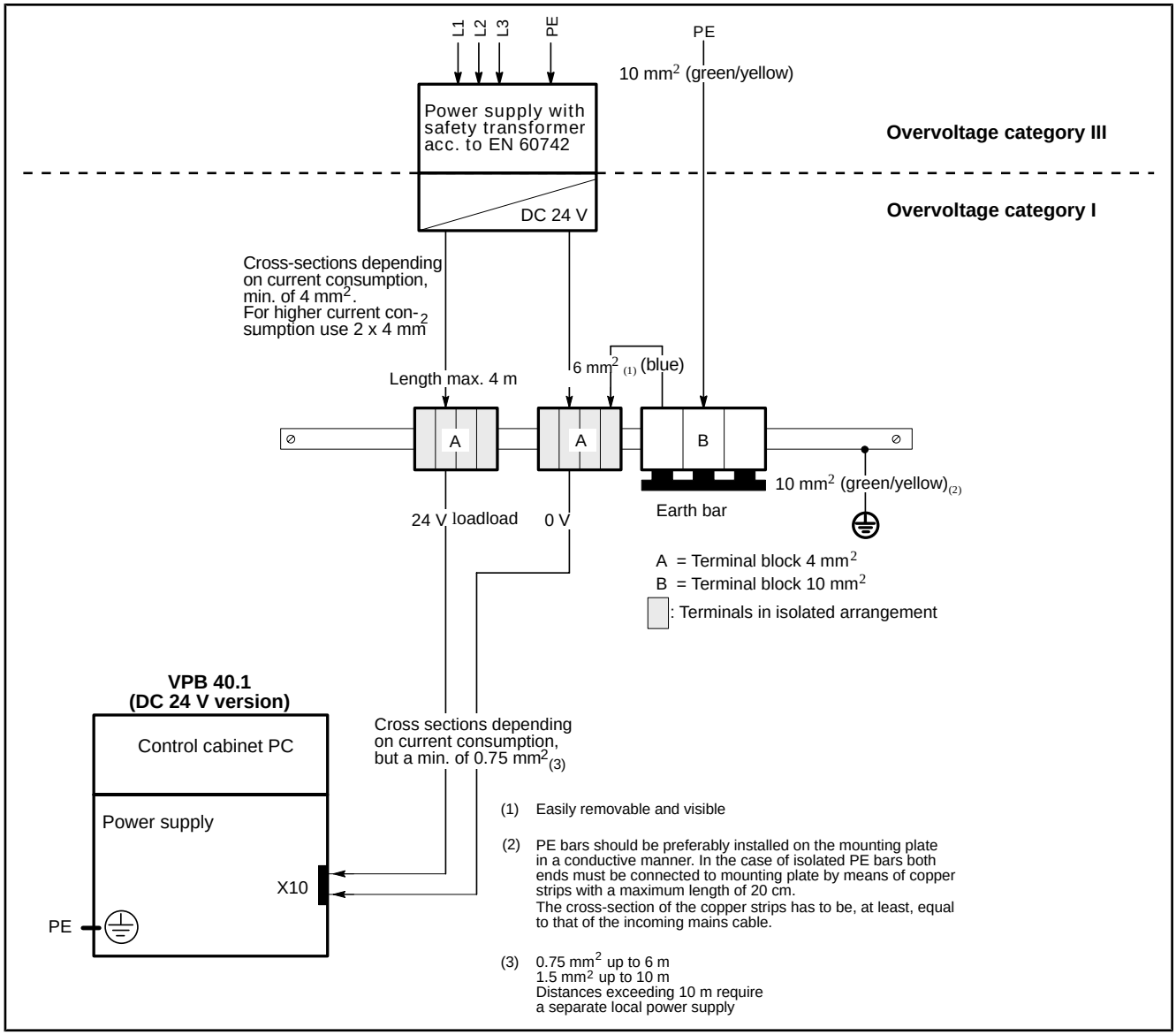

L1
L2
L3
PE
PE
10 mm² (green/yellow)
Power supply with safety transformer acc. to EN 60742
DC 24 V
Overvoltage category III
Overvoltage category I
Cross-sections depending on current consumption, min. of 4 mm².
For higher current consumption use 2 x 4 mm²
Length max. 4 m
6 mm² (1) (blue)
A
A
B
10 mm² (green/yellow)(2)
Earth bar
24 V loadload
0 V
A = Terminal block 4 mm²
B = Terminal block 10 mm²
: Terminals in isolated arrangement
VPB 40.1
(DC 24 V version)
Control cabinet PC
Power supply
X10
PE
Cross sections depending on current consumption, but a min. of 0.75 mm²(3)
(1) Easily removable and visible
(2) PE bars should be preferably installed on the mounting plate in a conductive manner. In the case of isolated PE bars both ends must be connected to mounting plate by means of copper strips with a maximum length of 20 cm.
The cross-section of the copper strips has to be, at least, equal to that of the incoming mains cable.
(3) 0.75 mm² up to 6 m
1.5 mm² up to 10 m
Distances exceeding 10 m require a separate local power supply

Fig.7-23: Wiring of the DC 24 V power connection to the VPB 40.1

⚠ DANGER

High electrical voltage! Danger to life and risk of injury caused by electric shock or bodily harm caused by net voltage on the protective extra-low voltage (e.g. +24V)! Connection of power supply units, which cause protective extra-low voltage, to net voltages, for which they are not designed.

The power supply unit with safety transformer according to EN 60742 must comply with overvoltage category III, see fig. 7-23 "Wiring of the DC 24 V power connection to the VPB 40.1" on page 42.

X20 – AC 230/115 V Power Supply

This connection is used for device variants for AC 230/115 V.

All internally required voltages are generated by the AC 230/115 V power supply unit.

⚠ CAUTION **The supply voltage must comply with overvoltage category II! Otherwise the integrated power supply unit might be destroyed.**

Use an isolating transformer to generate the AC230/115 V, see fig. 7-26 "AC 230 V voltage connection via isolating transformer" on page 44.

The AC 230/115 V connection occurs via a 3-pin inlet connector for AC connectors on the connector panel. The maximum line cross-section for the connected lines is 1.5 mm^2.

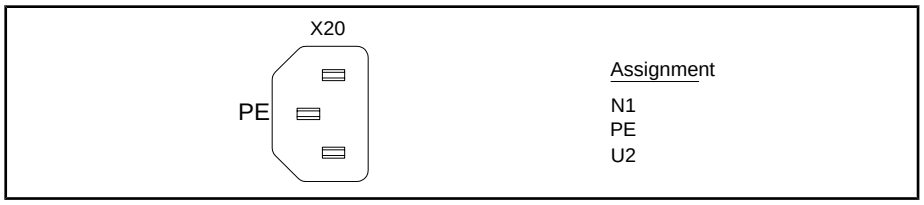


Fig.7-24: AC 230/115 V connection, X20, pin connection

Parameter	Value
Rated voltage	AC 85 V... AC 264 V auto range
Current consumption for U_N = AC 230 V	0.7 A
Current consumption for U_N = AC 115 V	1.4 A
Inrush current for U_N = AC 230 V	30 A cold start 25 °C
Inrush current for U_N = AC 115 V	15 A cold start 25 °C
Input fuse	1.6 A (5×20)

Fig.7-25: Technical data AC 230/115 V connection

Connections

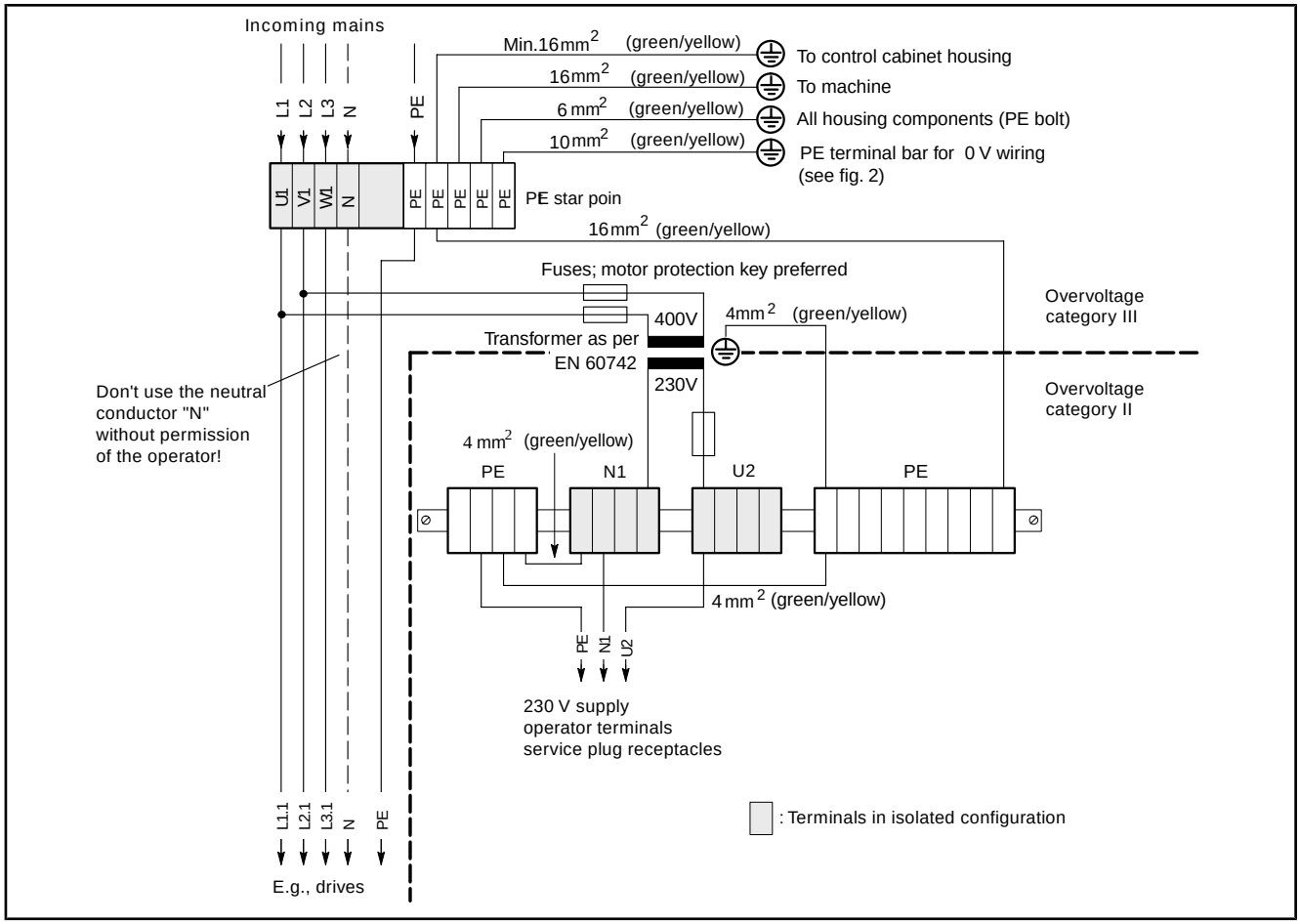


Fig.7-26: AC 230 V voltage connection via isolating transformer

⚠ DANGER

High electrical voltage! Danger to life and risk of injury caused by electric shock or bodily harm caused by net voltage on the protective extra-low voltage (e.g. +24V)! Connection of power supply units, which cause protective extra-low voltage, to net voltages, for which they are not designed.

Power supply units, whose net connection is designed for overvoltage category II, are to be connected to a net voltage with overvoltage category II, see fig. 7-26 "AC 230 V voltage connection via isolating transformer" on page 44.

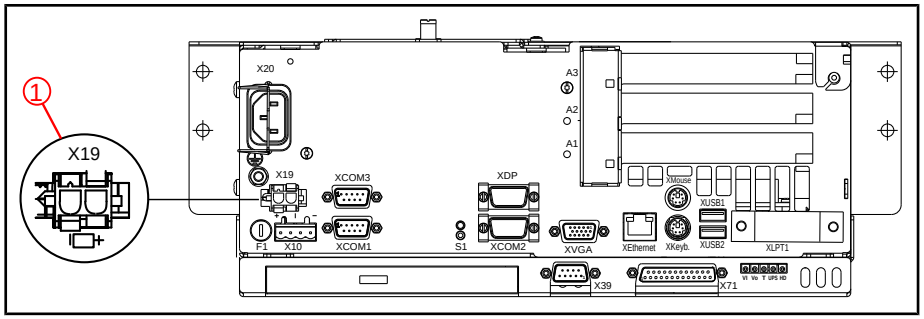
7.2.12 Battery Connection X19

X19 Battery Connection

Connection terminal for an external battery for the integrated UPS:

2-pin	
Cable length	3.0 m max.
Cable type	Unshielded, cross-section min. 1.5 mm²

Fig.7-27: Battery connection - X19



① X19 battery connection

Fig.7-28: Battery connection

7.2.13 Display Interfaces X71

G4 display interface

The G4 display interface is assigned to the 25-pin D-Sub female connector X71. Connect a VDP 16, VDP 40 or VDP 60 display to this female connector via a ready-made cable available as accessory, see chapter 11.2.4 "Connecting Cable to VDP 16, VDP 40 and VDP 60 (G4 and G5 Display Interface)" on page 74.

G5 display interface

The G5 display interface is assigned to the 25-pin D-Sub female connector X71. Connect a VDP 16 or VDP 40 display to this female connector via a ready-made cable available as accessory, see chapter 11.2 "Accessories" on page 74.

NOTICE

No screen output an operation possible at the VDP if G4 and G5 components are operated together.

Connect only devices with the same display interface

Example

If the control cabinet PC features a G5 interface, the connected operator display also must feature a G5 interface.

8 Maintenance and Installation

8.1 General Information

The VPB 40.1 are maintenance-free. However, some components are subject to wear and must be replaced.

Maintenance

Include the following measures in the maintenance schedule:

- At least once a year, check all plug and terminal connections of the components regarding proper tightness and possible damage. Check that cables are not broken or crushed. Replace damaged parts immediately.
- Check the fan at least once a year.

⚠ DANGER **Risk of injury by rotating fan impeller!**

The fan impeller must not to be touched with the hands and must not come into contact with other objects.

- Ensure that the batteries of the VPB 40.1 are fully functional. Activate the battery test of the UPS program, so that the battery pack is checked during each restart.

☞ Function compatibility for spare parts is ensured for at least five years.

8.2 Hard Disk

The hard disk frame can be accessed by a flap. The hard disk can be replaced, also including the installation frame.

⚠ WARNING **Data loss due to irregular or missing data backup!**

Backup all required application data as well as operating system settings on an external data carrier!

⚠ WARNING **Damages on the VPB 40.1 due to electrostatic discharges!**

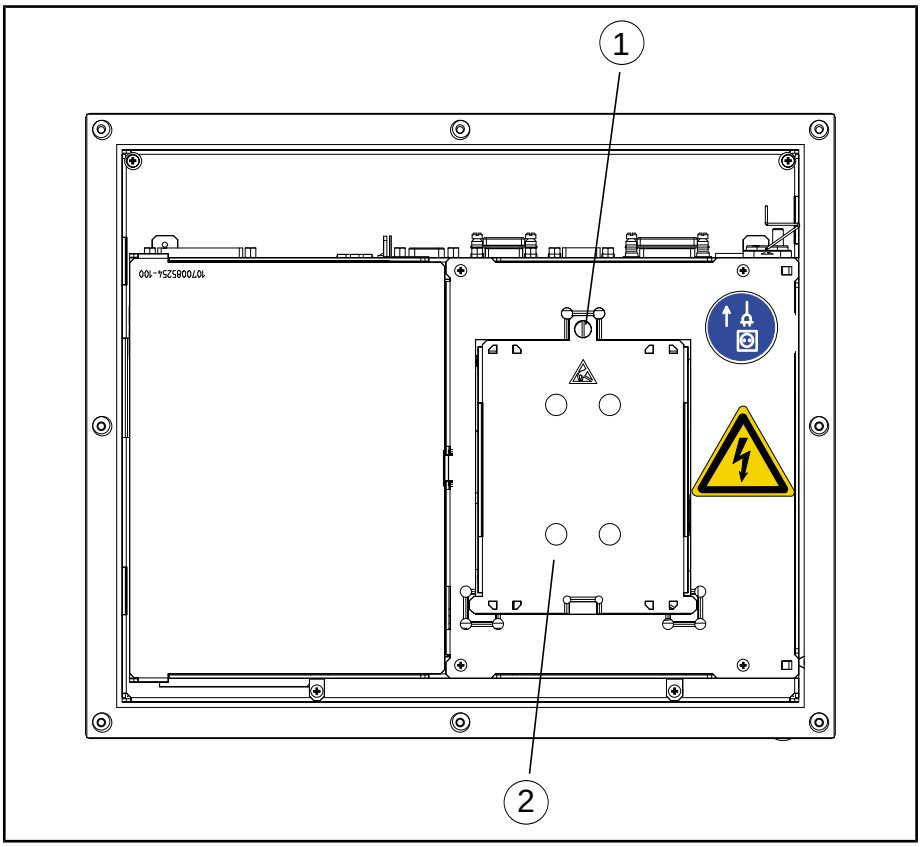
Comply with all ESD protective measures while working with modules and components! Avoid electrostatic discharges!

NOTICE **Loss of data and resinstallation of the operating system and application programs after a hard disk exchange due to a missing or irregular backup.**

Backup the hard disk regularly.

☞ The hard disk to be inserted must already have an installed operating system, if no floppy disk drive is connected to the VPB 40.1. In any case, it is recommended to have a completely installed operating system on the hard disk, to shorten the installation time!

1. All required user data as well as the operating system settings of your system are to be stored either on an external storage medium or via the network connection!
2. Switch off the supply voltage.
3. Wait until the power supply unit switches off automatically after the UPS operation (the UPS LED on the connector panel of the VPB 40.1 flashes red until the UPS switches off the power supply unit).
4. Now, unplug the battery cable (connector X19).
5. If required, unplug all connectors from the VPB 40.1.
6. Loosen the fastening screw of the installation frame on the top side of the VPB 40.1, see fig. 8-1 "Position of installation frame and fastening screw" on page 48. Lift the hard disk frame and after releasing the retaining spring unplug the ribbon cable, with which the hard disk is connected to the main board. Now you can remove the installation frame with the hard disk.



① Fastening screw
② Installation frame

Fig.8-1: Position of installation frame and fastening screw

1. The new hard disk is shipped including the installation frame. As described above, the new hard disk is always mounted with the installation frame in reverse order.

NOTICE **Damage of hard disk due to improperly connected or wrong hard disk cable.**

Check the cable connections leading to the hard disk and the interface connectors for tightness and verify, if the voltage supply is ready for use.

2. The new hard disk parameters are automatically identified by the system. If the operating system does not boot automatically, the power supply is to be interrupted for at least 10 seconds. A restart needs to be carried out again.
3. After properly booting the PC the user data and the operating system settings for the normal mode have to be restored.

8.3 CMOS Battery

The battery used for buffering the RAM and the clock has a limited service life, see also chapter 4.8 "Wear Parts" on page 23.

This lithium battery must not be changed by the user. The battery may only be exchanged by the Bosch Rexroth Service (see chapter 12 "Service and Support" on page 77) or by personnel trained and authorized by the Service.

⚠ WARNING **Warning: Battery safety. Risk of fire, explosion, and burns.**

Do not recharge, disassemble, crush, heat above 100°C (212°F) or incinerate. Dispose of used battery promptly. Keep away from children!

8.4 Battery Pack

For the uninterruptible power supply of VPB 40.1 an external battery pack for control cabinet mounting is available.

Connection battery pack

The battery pack is connected with the 2-pin male connector strip X19 situated at the connector panel on the upper side of the PC box. For this, use an unshielded cable with line cross-sections of at least 1.5 mm^2. The cable length is maximum 3.0 m.

Bosch Rexroth provides ready-made cables with a length of 1.0 m and 3.0 m, see chapter 11.2.2 "Battery Pack and cables" on page 74.

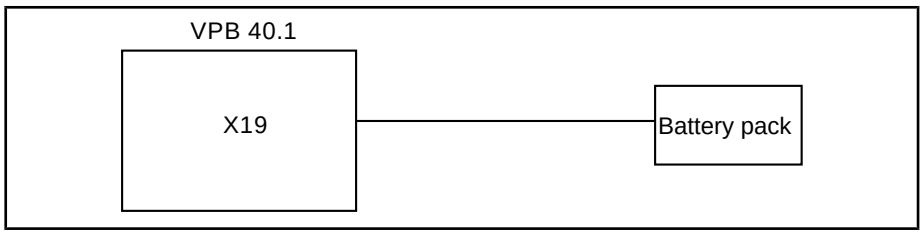


Fig.8-2: External battery pack

To connect the external batteries proceed as follows:

1. Select a suitable position for mounting the battery in the control cabinet. The battery pack should be mounted in a cool place in the control cabinet because the surrounding air temperature directly influences the service life of the battery. A required mounting position can be selected (see the following figures).

Maintenance and Installation

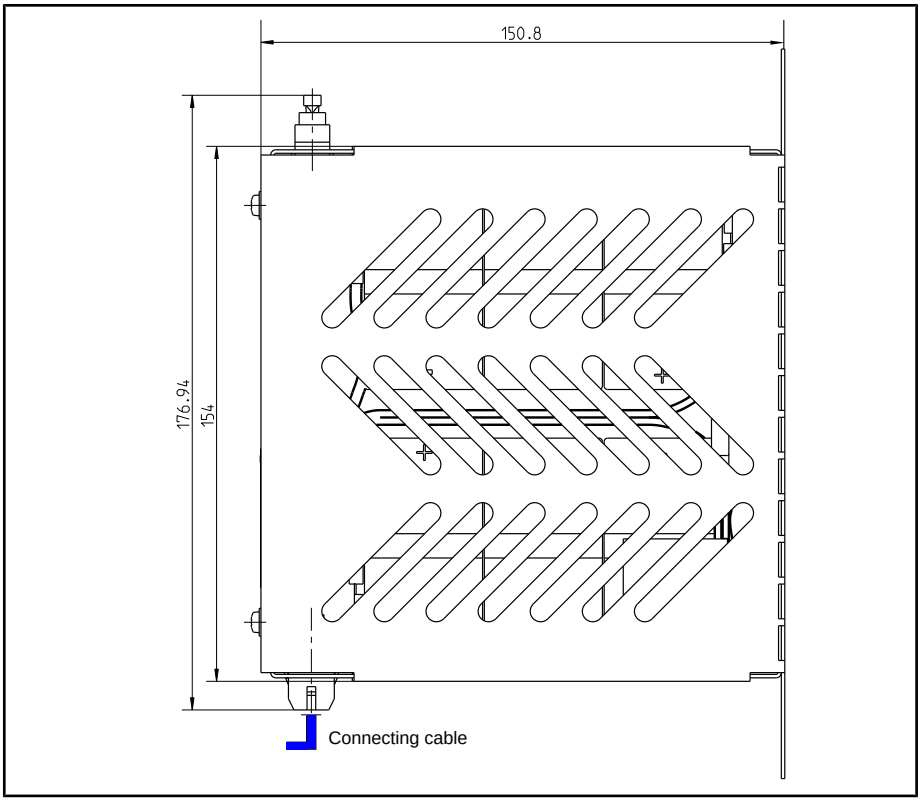


Fig.8-3: Battery pack for screw mounting: Mounting position

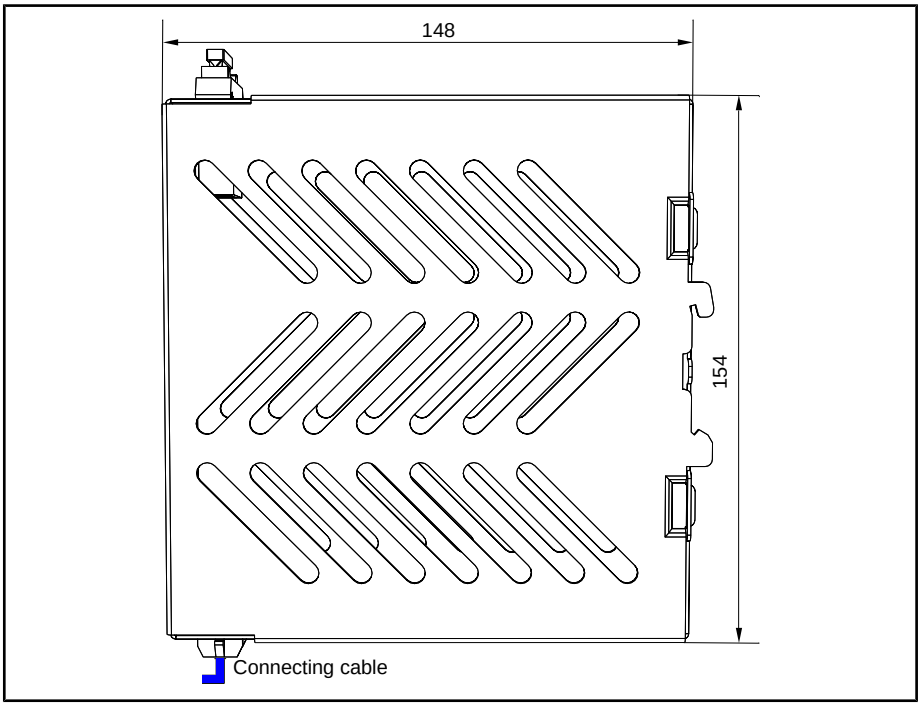


Fig.8-4: Battery pack for top-hat rail mounting: Mounting position

2. Provide sufficient distances (in mm) for cooling and cable routing (see the following figures).

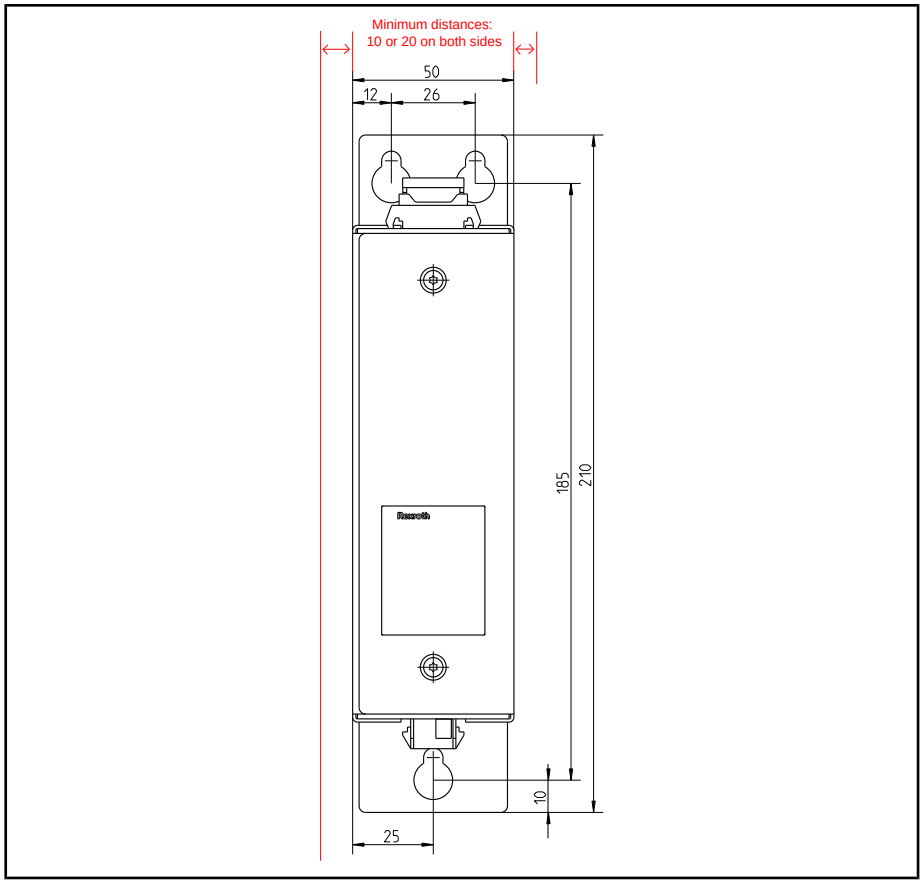


Fig.8-5: Battery pack for screw mounting: Minimum distances for cooling and cable routing

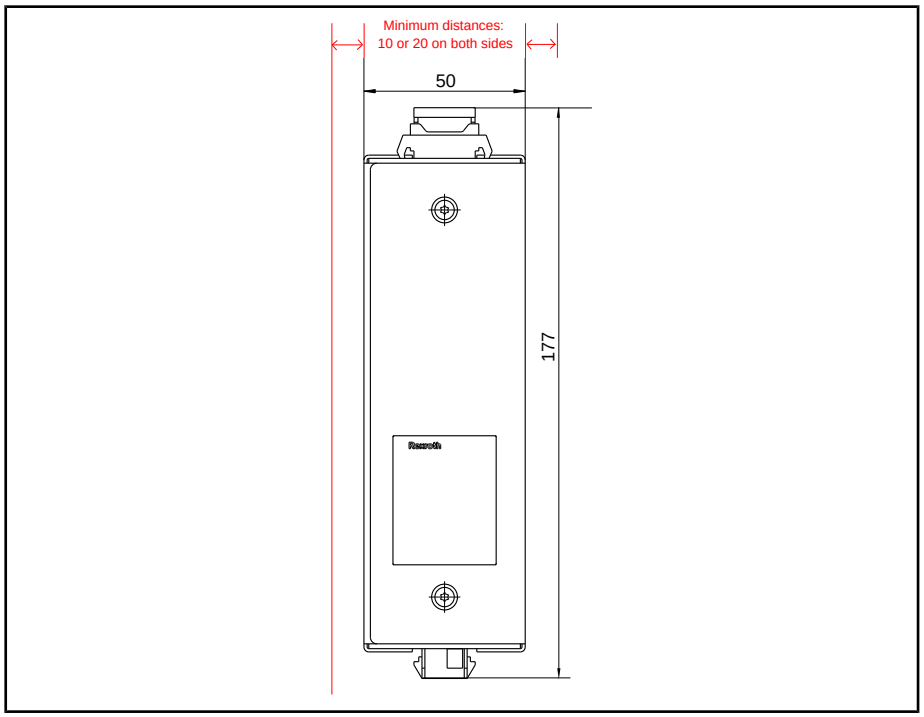


Fig.8-6: Battery pack for top-hat rail mounting: Minimum distances for cooling and cable routing

3. Fix the battery pack in the control cabinet.

4. Switch off the supply voltage for the VPB 40.1. If required, unplug all connectors from the VPB 40.1.
5. Connect the 2-pin battery cable to interface X19 of the operator terminal. The original cable is reverse voltage protected.

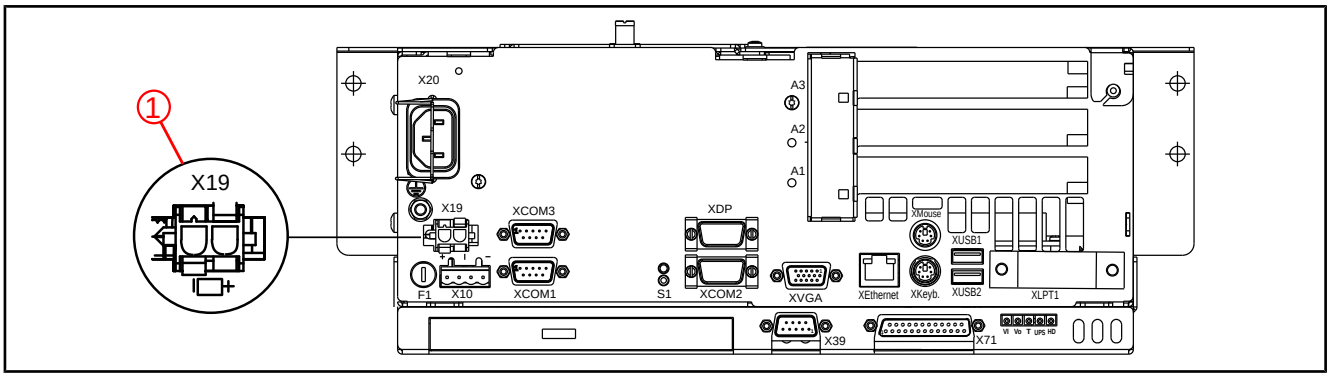


Fig.8-7: Position and pin assignment of the battery connection

⚠ DANGER

Ensure that the polarity of the battery is correct. In the case of a polarity reversal of the battery a F10A (5x20) fuse is released on the power supply unit. Notes on the replacement of the fuse are given in chapter 8.6 "Exchanging the Fuses" on page 56.

1. Switch on the supply voltage for the VPB 40.1 again.
2. Observe the illuminated symbol "UPS" on the front panel of the connected VDP:
   - UPS illuminated symbol off: Batteries already charged
   - UPS illuminated symbol flashes red: Batteries discharged

     Wait approximately 5 hours until the batteries are charged and the UPS symbol extinguishes.

NOTICE

Insufficient UPS protection for controlled shutdown of the PC during the charging time if the new battery pack is not yet charged.

Therefore use charged batteries, if possible. The charging time of a 2.5 Ah battery is approximately 5 hours.

Replacing the battery pack

The battery pack must be replaced in the following cases:

- The battery test failed during system boot.
- The number of charging cycles exceeds the value depending on the surrounding air temperature and specified in "Charging cycles" on page 53.
- The red illuminated symbol "UPS" on the VDP front panel flashes longer than eight hours.

⚠ WARNING **Data loss in the RAM during battery exchange due to missing data backup!**

Before replacing the battery backup important data because during battery exchange a voltage loss is possible, which might cause data loss in the RAM.

Charging cycles

A charging cycle is determined by switching the PC power supply unit on and off. As long as the operator terminal is connected to the supply system, a total discharge of the battery pack is avoided.

The number of charging cycles of the battery pack and thus, its service life is dependent on the surrounding air temperature, in which the battery pack is used. Surrounding air temperature defines the temperature, in which the operator terminal and the battery pack are situated, e. g. the internal temperature of the control cabinet or in an operator panel housing.

The following table can be used as guideline:

Surrounding air temperature	Maintenance interval
25 °C	10 years
35 °C	5 years
45 °C	2.5 years

Fig.8-8: Battery pack - maintenance interval: external battery pack for top-hat rail mounting and for screw mounting

☞ The used batteries are recyclable and can be returned to Bosch Rexroth after replacement. They must not be disposed in the standard household refuse!

8.5 Extension Cards

8.5.1 General Information

For plugging extension cards slots for PCI and ISA bus are available. According to the PC box type a maximum of four PCI cards and of one ISA board is possible, see also chapter 4.1 "PC Box" on page 19. The maximum length allowed for the cards is 180 mm.

⚠ WARNING **Risk of damage to the VPB 40.1 or to the extension cards due to electrostatic discharges!**

Comply with all ESD protective measures while working with modules and components! Avoid electrostatic discharges!

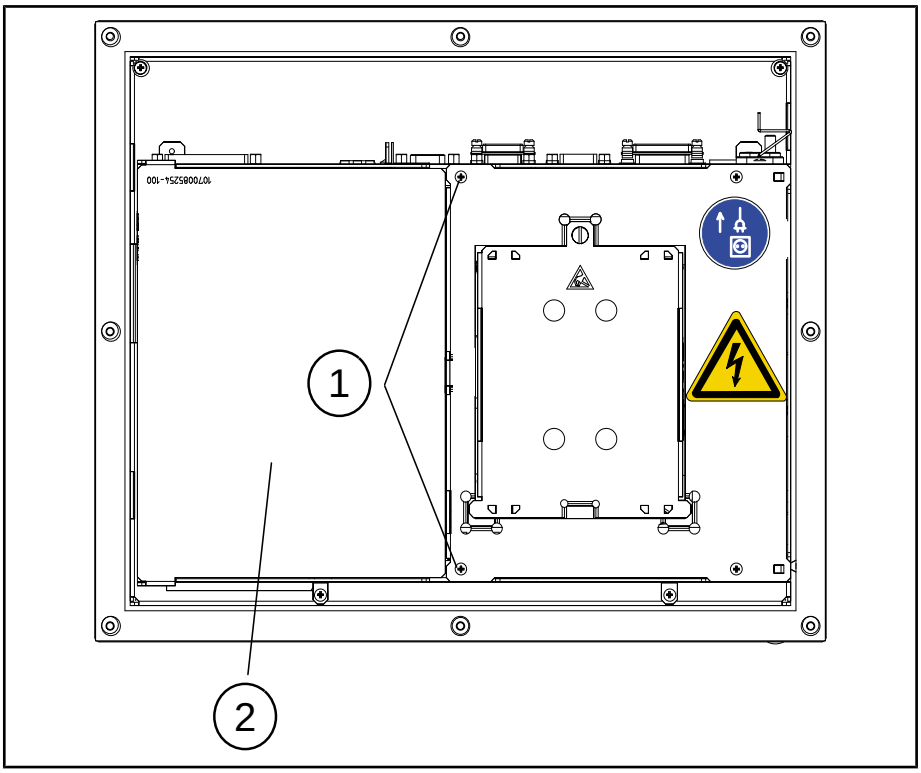
⚠ WARNING **Risk of damage to the VPB 40.1 or the application software by integrating optional cards that are not released!**

Install only released extension cards. Installation is only to be carried out by authorized personnel.

8.5.2 Installing Extension Cards

1. Switch off the supply voltage.

2. Wait until the power supply unit switches off automatically after the UPS operation (the UPS LED on the connector panel of the VPB 40.1 flashes red until the UPS switches off the power supply unit).
3. Now, unplug the battery cable (connector X19).
4. If required, unplug all connectors from the VPB 40.1.
5. Remove the housing cover at the rear side. For this, only loosen the fastening screw at the side, at which the additional slots are situated. This part of the housing cover can now be removed.



① Fastening screws
② Rear covering plate

Fig.8-9: Position of housing cover and fastening screw

6. The cover closing the air gap must be removed.
7. Remove the fastening screws from the slot cover.
8. Place the extension card and fix it with the fastening screw.

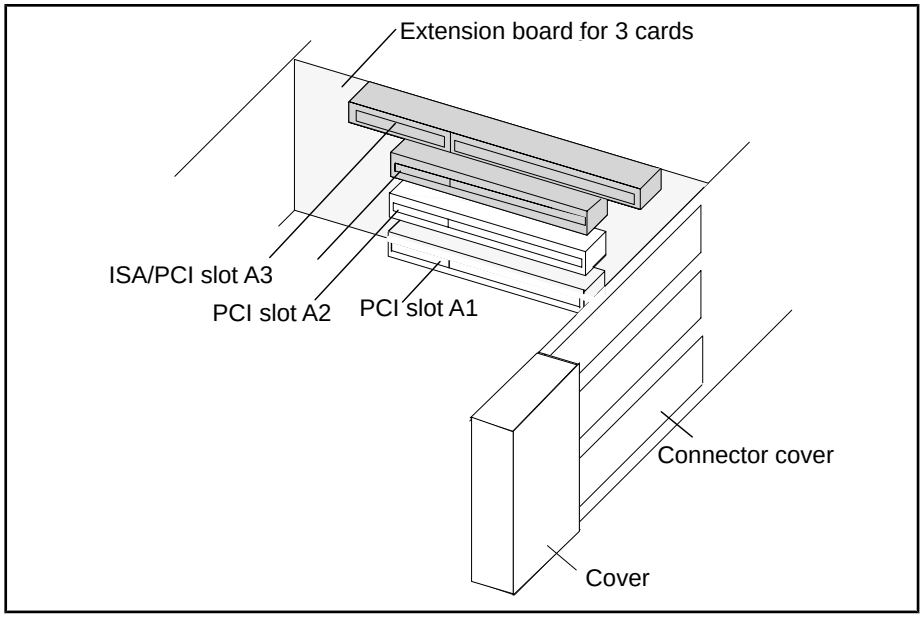


Fig.8-10: Position of the slots for extension cards

9. Then, snap in the cover again.
10. Mount the housing cover.
11. Plug in the battery cable again.

⚠ WARNING **Destruction of an extension card or of the main board caused by parallel equipment with PCI and ISA card!**

The combined PCI/ISA bus slot must not be equipped with a PCI card and an ISA card at the same time!

If the card is equipped with a Plug and Play (PnP) function, it is automatically recognized by the operating system and integrated in the system, provided that there are no hardware conflicts (IRQ etc.) with other extension cards or connected devices.

There can be different causes if functions - based on the new card - are not available after the system reboot:

- The card is not properly seated in the PCI or ISA slot.
- The driver software of the card is not installed or its installation is faulty.
- IRQ (Interrupt) conflict with other PC hardware components.
- The software of the card was not installed.

⚠ WARNING **Risk of destruction of the main board or the ISA card caused by address conflicts (IRQ, memory access, I/O address)!**

Consider the specifications of the card manufacturer. It might be required to set new configurations in the BIOS and in the operating system (e.g. Windows Control Panel).

8.5.3 BIOS Settings

☞ IRQ0 to IRQ6, IRQ8 to IRQ13 and IRQ15 are already assigned and are not available for PCI and ISA extension cards anymore!

PCI slot

In the BIOS submenu "PnP/PCI Configurations", each PCI slot can be assigned to an IRQ address. By specifying the IRQ address the priority is specified at the same time.

If only PnP[1)] cards are used, the "AUTO" setting is to be kept.

8.6 Exchanging the Fuses

Several fuses are integrated in the VPB 40.1 devices. The two following figures show their position. If a fuse has to be replaced, the new fuse must have the values specified in fig. 8-13 "Fuses" on page 58. Furthermore, it must be UL-certified.

⚠ DANGER **Lethal electric shock by live parts with more than 50 V! Risk to damage the device due to short-circuits!**

- Before you open the control cabinet PC VPB 40.1 to replace a fuse, disconnect it from the power supply (230 V or 24 V)!
- Also disconnect the external batteries, before you open the VPB 40.1 .

⚠ WARNING **Risk to damage the operator terminal by electrostatic discharges!**

Comply with all ESD-protection measures during replacing a fuse! Avoid electrostatic discharges!

1) *PnP card = Plug-and-Play card*

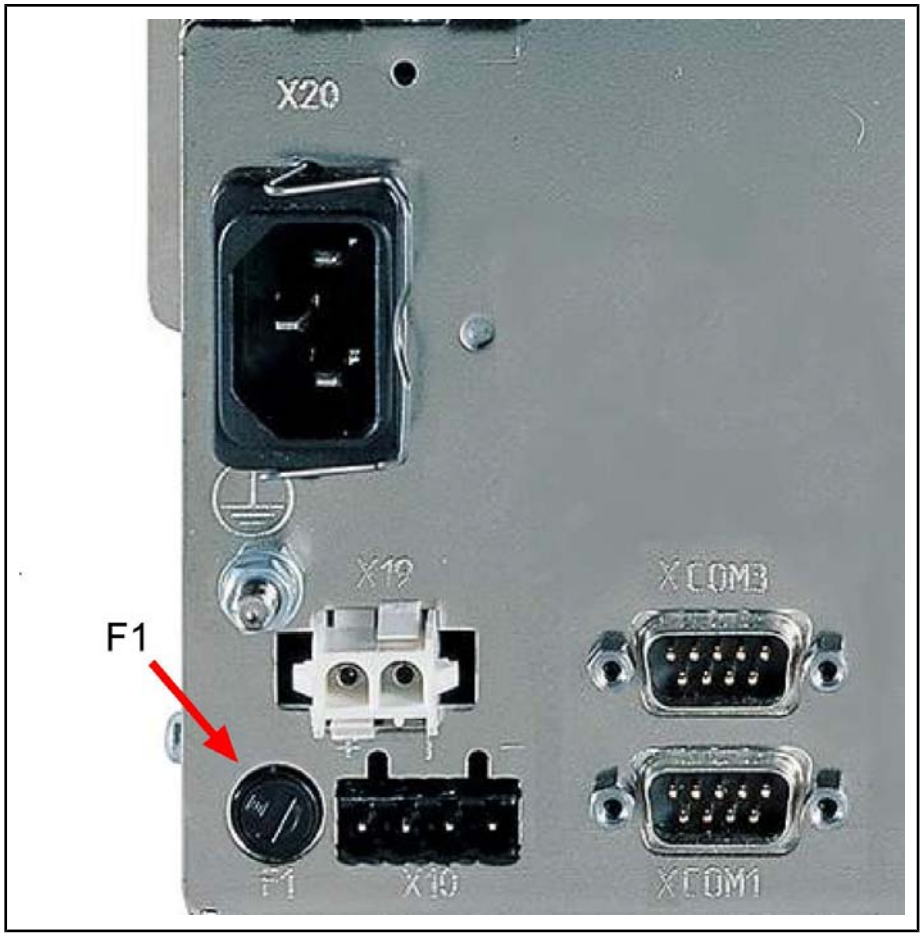


Fig.8-11: Fuse F1 on the connector panel

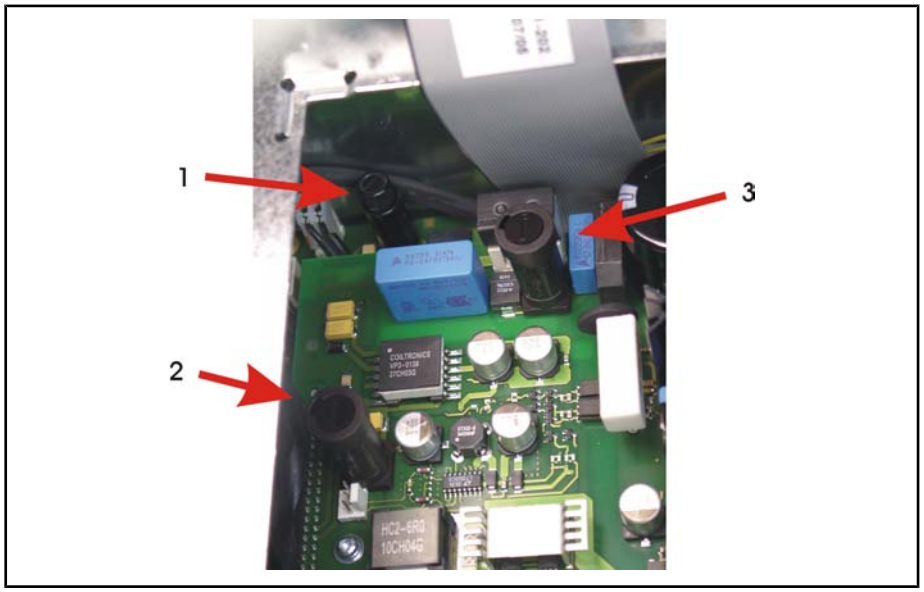


Fig.8-12: Fuses on the power supply unit and the carrier board (under the harddisk case)

Maintenance and Installation

Position	Function	Values	Order number
Connector panel (F1, see fig. 8-11 "Fuse F1 on the connector panel" on page 57)	Input voltage 24 V	6.3 A, time-lag (5 x 20)	1070 922 300
Supply unit board (No. 3, see fig. 8-12 "Fuses on the power supply unit and the carrier board (under the harddisk case)" on page 57)	Input voltage 230 V	2 A, time-lag (5 x 20)	1070 906 959
Carrier board (No. 1, see fig. 8-12 "Fuses on the power supply unit and the carrier board (under the harddisk case)" on page 57)	Batttery minus	10 A, fast-acting (5 x 20)	1070 904 575
Supply unit board (No. 2, see fig. 8-12 "Fuses on the power supply unit and the carrier board (under the harddisk case)" on page 57)	Battery plus	10 A, fast-acting (5 x 20)	1070 904 575

Fig.8-13: Fuses

9 Software

9.1 Application Software of the Monitoring Functions

9.1.1 Temperature Monitoring

The surrounding air temperature of the VPB 40.1 must not exceed +45 °C. To ensure operational reliability, the control cabinet PC features a temperature monitoring that measures the internal housing temperature.

1. For **temperatures > 50 °C** in the housing a temperature warning is indicated:
   - via the red flashing LED on the front panel of the VDP or
   - via a message window displayed by the operating system. This message is also to be evaluated by all application programs, especially by I/O processes.

   The temperature warning can be disabled by the program **UPS NT** for Windows (see chapter "UPS NT Program " on page 60).
2. For **temperatures** greater than **65 °C** the system is always **shut down and switched off** via the UPS logic (see chapter 9.1.2 "Uninterruptible Power Supply (UPS)" on page 59). This applies for all VPB 40.1 housing variants.

⚠ DANGER **Uncontrolled machine movements!**

Always ensure that temperatures remain within the non-critical range. In the case of application-sensitive procedures, ensure that machine movements are terminated in a controlled manner before the temperature monitoring function switches off the VPB 40.1.

9.1.2 Uninterruptible Power Supply (UPS)

General Information

NOTICE **Malfunction of the UPS due to software not installed or wrongly installed.**

The uninterruptible power supply is only ready for operation, if the corresponding software is installed. If necessary, the UPS NT software can be installed with the BRCVInstall installation software on the VPB 40.1. The software can be accessed via a desktop icon.

Operating Principle of the UPS

In the event of a voltage breakdown or if the temperature exceeds 65 °C the UPS logic of the VPB 40.1 power supply unit allows a safe operating system shutdown by means of an battery pack.

In the event of a **voltage breakdown > 20 ms**, battery operation is activated (provided that the battery pack is ready for use).

Software

NOTICE

Possible damage of connected machines if the VPB 40.1 is switched off after at least three minutes by the UPS hardware in the event of power failure and UPS operation.

The UPS logic of the VPB 40.1 power supply unit is designed for a safe shutdown of all application programs and the operating system. The UPS logic is not designed to maintain the operation during a longer voltage loss!

⚠ DANGER

Uncontrolled machine movements or data loss due to defective batteries.

If there are no batteries in the unit or if the batteries are defective or discharged, the VPB 40.1 is RESET after a voltage breakdown > 20 ms!

Uncontrolled machine movements or a data loss can be caused.

Voltage Breakdown < 800 ms

If the duration of the voltage breakdown is below 800 ms, the power supply unit switches automatically from battery mode to normal mode.

Voltage Breakdown between 800 ms and 60 s

If the voltage breakdown is > 800 ms, the operation system initiates a system shutdown after a selectable time (delay time). This delay time shall be used to close all active applications by the user or by special routines.

If the supply voltage is available again within 60 seconds, the UPS interrupts the operating voltage for further 8 seconds. After that, the operating system is rebooted.

Voltage breakdown > 60 s

If the voltage breakdown lasts longer than 60 seconds, the UPS switches off the power supply unit.

☞ Setting the Delay Time in the **UPS NT** additional software, see chapter "UPS NT Program " on page 60.

UPS NT Program

The **UPS NT** program controls and monitors the integrated uninterruptible power supply (UPS). Additionally, the program features the following functions:

- Monitoring the system temperature in the device
- Monitoring the function of the fans
- Monitoring the internal operating voltages
- Checking the charging status of the batteries, if required
- Setting the COM interface for the keyboard controller
- Setting the SIS interface mode

The communication between program and UPS occurs via the serial interface COM4.

The program consists of two parts:

1. Control Panel Applet
2. Actual Windows NT service

In the event of votlage breakdown within a settable time (Delay Time: 60 seconds max.) the UPS program has the following tasks:

- Sending a message to all active applications so that the user or special application routines can close them.
- Shutdown the operating system after the expiration of the Delay Time.

Once the voltage monitoring has been activated, the system shutdown cannot be stopped anymore.

Closing all active applications prevents data loss in the event of an unexpected voltage breakdown. After a maximum of 60 seconds the UPS switches off the PC power supply unit, if the supply voltage has not been restored, see chapter "Operating Principle of the UPS" on page 59.

During normal operation the user cannot access the UPS NT program. The program can be operated and set only with special rights and after a restart of the operating system.

NOTICE **Possible damages to connected machines if a shutdown of the VPB 40.1 is caused by wrong UPS NT parameters.**

Parameters set in UPS NT may be only changed after consulting Bosch Rexroth.

UPS NT - Operation and Configuration

NOTICE **No operation possible due to missing administrator rights.**

Administrator rights are necessary for operation!

Start/Stop

The UPS NT program starts **automatically** while Windows XP is booted.

If the service shall be stopped, terminated or restarted (e.g. because of a reinstallation or update), select the service manager in the Windows Control Panel.

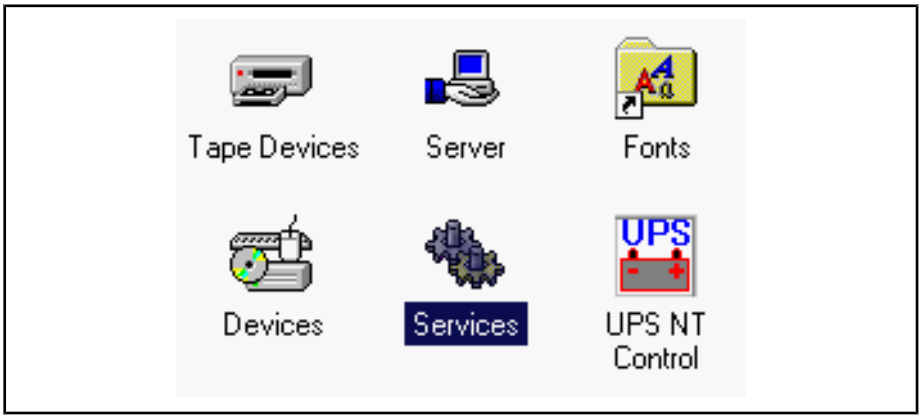
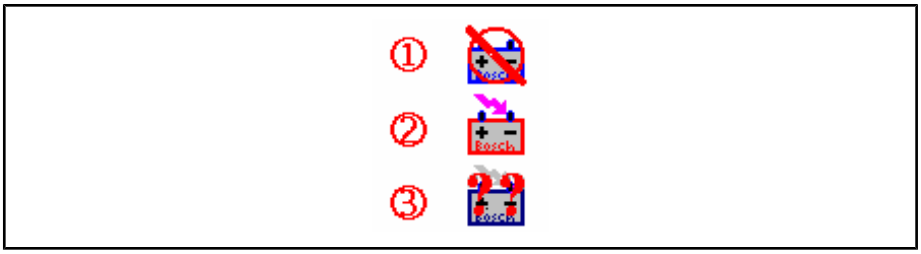


Fig.9-1: Service manager of the Windows control panel

The respective operating status of the service is indicated in the Windows task bar.

Software



① Service has been started, but is not ready for operation yet
② Service is in operation
③ Service is in operation, however errors have been indicated during the start (battery, temperature, fan and voltage errors)

Fig.9-2: Indication of the operating status of the service in the Windows task bar

In the service manager of Windows the status of the UPS NT service is indicated:

- UPS NT stopped: No entry in the status column
- UPS NT started: Entry **Started** is displayed as status

Click on the **Start** or **Stop** buttons to start or stop the marked entry **UPS NT Service**.

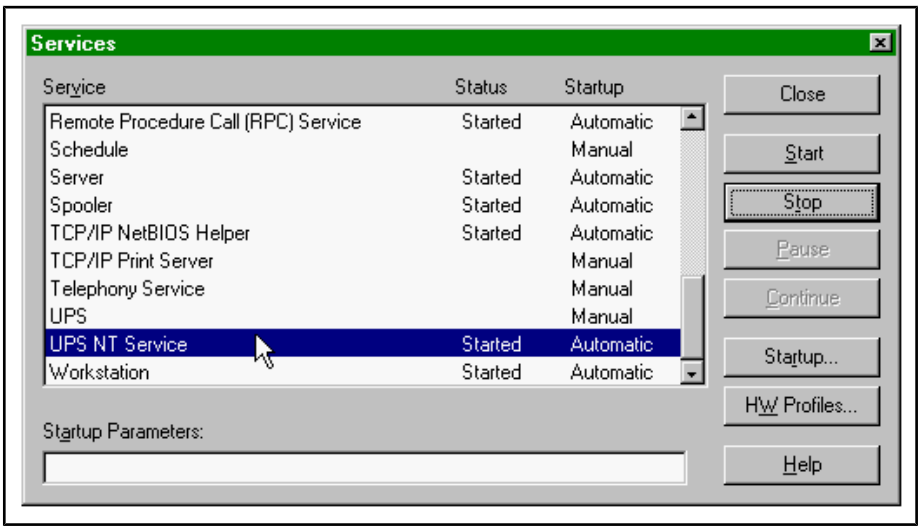


*Fig.9-3: **Services** window*

Configuration

To configure the UPS NT program, select **UPS NT Control** in the control panel, see fig. 9-4 "Symbol **UPS NT Control** in the Windows Control Panel" on page 63.

NOTICE

Closing the program or stopping the monitoring is not possible due to missing administrator rights.

The UPS NT program always runs as a Windows NT service. Changing the user does not influence this behavior. The user cannot terminate the program or stop the monitoring without administrator rights.

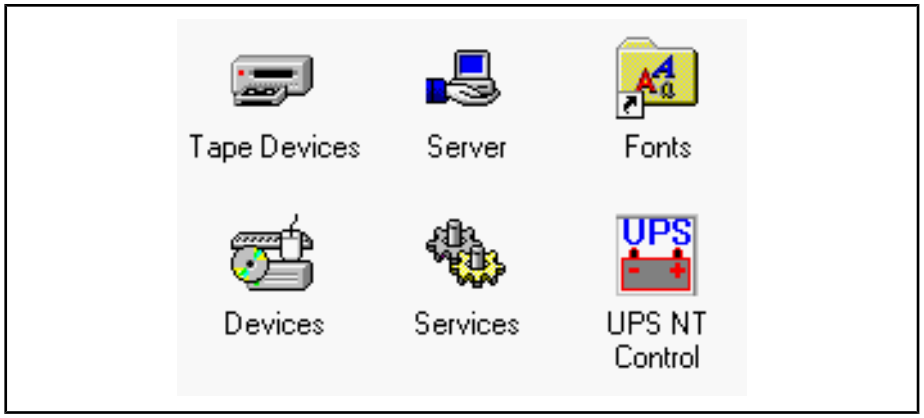


*Fig.9-4: Symbol **UPS NT Control** in the Windows Control Panel*

UPS Properties and Maintenance

After selecting symbol **UPS NT Control**, the window **UPS Properties and Maintenance** appears.

The window offers the following tabs, in which further settings can be made:

- **UPS General** tab
- **System Health** tab
- **Profi Bus / Mode COM3** tab
- **About** tab

UPS General

After calling up, first, the **Register UPS General** tab is active, with which the basic settings of the starting and run time behavior of the UPS are specified.

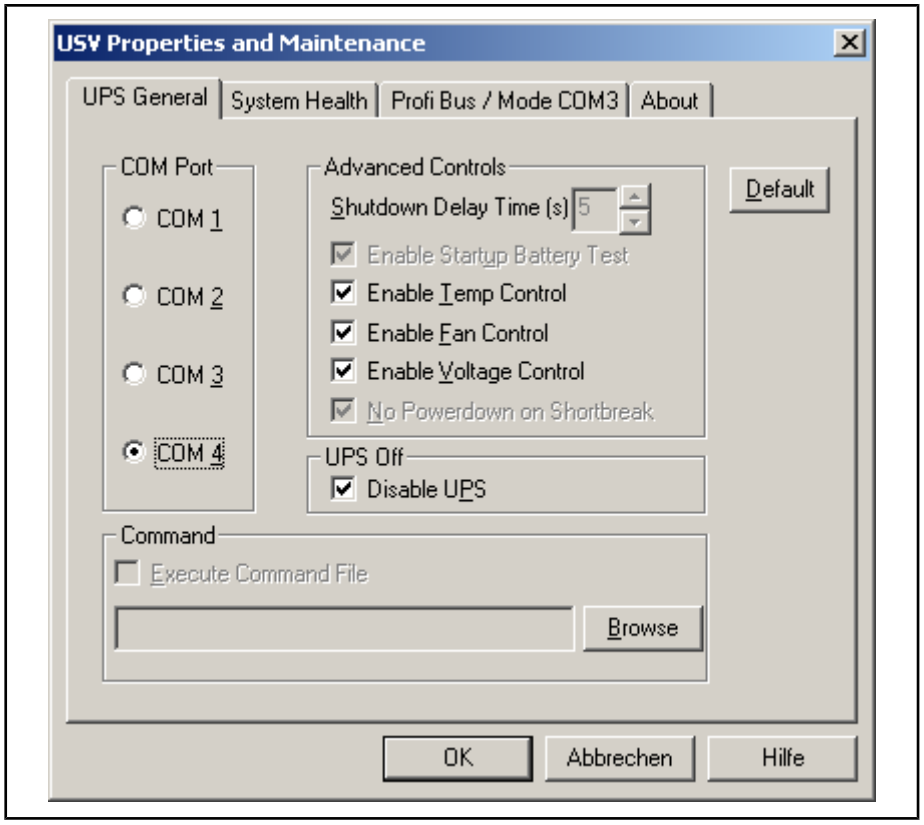


*Fig.9-5: **UPS General** tab*

NOTICE **No monitoring (approx. 5 to 10 seconds) after parameter modifications.**

To activate parameter modifications the UPS program is automatically stopped and restarted During this time (approx. 5 to 10 seconds) there is no monitoring.

COM Port:

In this group the serial communication interface is selected to which the UPS is connected. If one or more serial interfaces are deactivated in the BIOS, Windows NT "numbers" the remaining interfaces. Therefore, a new interface has to be selected in the configuration dialog under COM port. If no interface is found during the start of the service, a corresponding dialog box opens and the service is terminated.

The following settings can be made in the **Advanced Controls** group:

Shutdown Delay Time:

In this field a delay time for the shutdown from 0 to 45 seconds is defined. This is the time the user has to backup his data. After the expiration of the delay time all application programs are terminated without a prompt!

When defining the **Shutdown Delay Time**, observe that between the end of the **Shutdown Delay Time** and the expiration of the 60 seconds after the power down signal remains enough time to shut down the operating system (for closing the Windows system files and generating backups). If the time is too short, the shutdown process is interrupted, because the UPS interrupts the voltage of the power supply unit. This can cause data loss.

NOTICE **Data loss of of not saved data of opened application programs after expiration of the "Shutdown Delay Time".**

Once the **Shutdown Delay Time** has been expired, the operating system is shutdown without a prompt.

Enable Startup Battery Test:

If the **Enable Startup Battery Test** checkbox is activated, the battery pack is checked during each restart. In error case an error dialog is generated and a message is sent to the whole system. The UPS program is still running.

After 12 hours the battery test is automatically repeated:

- If no further error occurs, the battery test is automatically repeated every 12 hours.
- If an error occurs, an error dialog is generated, a message is sent to the whole system and the UPS program is terminated.

Enable Temp Control:

If this checkbox is activated, the surrounding air temperature is monitored continuously. If +50 °C are exceeded, a warning window is displayed and on the device front the LED "Temp" flashes. The temperature warning can be switched off.

For temperatures greater than +65 °C the system is always shut down and switched off via the UPS logic.

The voltage monitoring is still active after a temperature warning.

Enable Fan Control:

If this check box is activated, the existing housing fans and CPU fans are monitored. In error case a corresponding message is indicated and is sent to the whole system.

Enable Voltage Control:

If this checkbox is activated, the internal supply voltages are monitored. In error case a corresponding message is indicated and is sent to the whole system.

No Powerdown on Shortbreak:

If this checkbox is activated, interruptions of the supply voltage up to 5 seconds are permissible without influencing the operation. Only for voltage breakdowns > 5 seconds the UPS logic is started and the shutdown of the system is initiated.

UPS Off, Disable UPS:

The function **UPS Off, Disable UPS** deactivates the UPS monitoring and the delay, when the power supply unit is switched off:

- If a voltage breakdown occurs, the PC switches immediately off.
- After a conventional shutdown of the system, there is no waiting time of approximately 60 seconds until the power supply unit switches off.

This function shortens the waiting time during commissioning and software installation. However, this checkbox must not be activated in the normal mode!

⚠ CAUTION

Data loss if voltage loss occurs during activated "UPS Off, Disable UPS" checkbox! Damages to connected machines and to VPB 40.1 are possible if the VPB 40.1 switches off immediately while the "UPS OFF" checkbox is activated.

If this checkbox is activated, a proper system shutdown is no longer possible during a voltage breakdown. The device switches off immediately! Therefore, this checkbox must not be activated during normal operation!

Command

In the **Command** group an executable program (*.exe; *.bat) can be entered and activated, which should be started and executed after the initialization of the shutdown. This is always reasonable, if applications which do not respond to the system messages, have to be backuped or stopped. For this, corresponding clearing and terminating programs can be entered and activated. If several programs are to be executed or if the programs feature transfer parameters, they have to be combined and entered in a batch file.

NOTICE

Possible malfunctions if request parameters are transmitted.

The entry must not contain any request parameters and the specified program must not start any shutdown!

Default

If the **Default** button is activated, all settings are reset to their **Default values**.

These default values are:

- COM Port: COM4
- Shutdown Delay Time: 30 seconds
- Enable Startup Battery Test: active

Software

- Enable Temp Control: active
- Enable Fan Control: active
- Enable Voltage Control: active
- Disable UPS: inactive
- No Powerdown on Shortbreak: active
- Execute Command File: inactive

System Health

This tab indicates the current measured values of the internal operating voltages, the battery voltage, the system temperature and the status of the fan function.

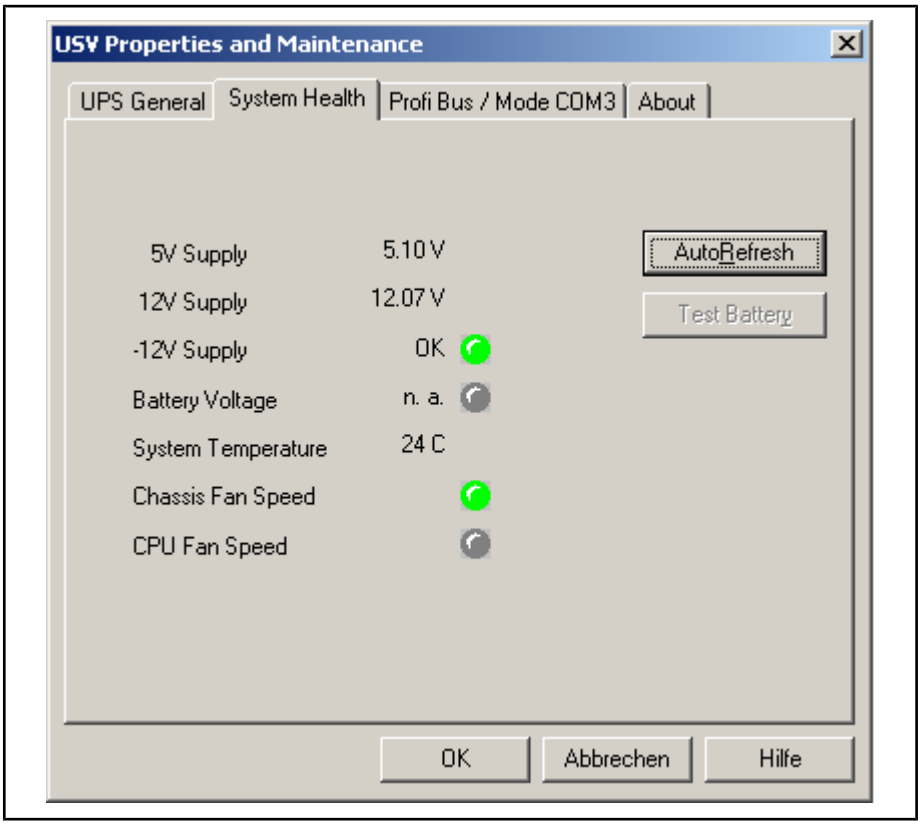


*Fig.9-6: **System Health** tab*

The value of the battery voltage (**Battery Voltage**) is only updated after a battery test. The battery test occurs automatically after a system start and then every 12 hours or after having pressed the **Test Battery** button.

- The LED flashes red, if the value of the battery voltage, which was measured under load, is too low.
- The LED flashes green, if the battery pack is ready for operation.

NOTICE

Possible damages to the VPB 40.1 and the connected machines if the UPS functionality is not guaranteed anymore caused by excessive battery tests.

Excessive battery tests discharge the battery pack. Do not perform more than five battery tests within a 24 hour period.

The following applies to the fan monitoring (**Fan Speed**):

- Red LED: Fan stands still, or fan speed is too low or too high.
- Green LED: Fan is working properly.

Clicking on the **StopAutoRefresh** button, disables the automatic update of the measured values and the labeling on the button changes to **AutoRefresh**.

Clicking on the **AutoRefresh** button, enables the automatic update of the measured values and the labeling on the button changes to **StopAutoRefresh**.

Profibus and further settings

The **ProfiBus/Mode COM3** tab consists of the following both segments:

- **Profibus Adr.**: Select the PROFIBUS address
- **Select COM3 Connection**: Selection, if the COM3 interface is provided as serial interface at the XCOM3 connector or is internally connected with the keyboard controller.

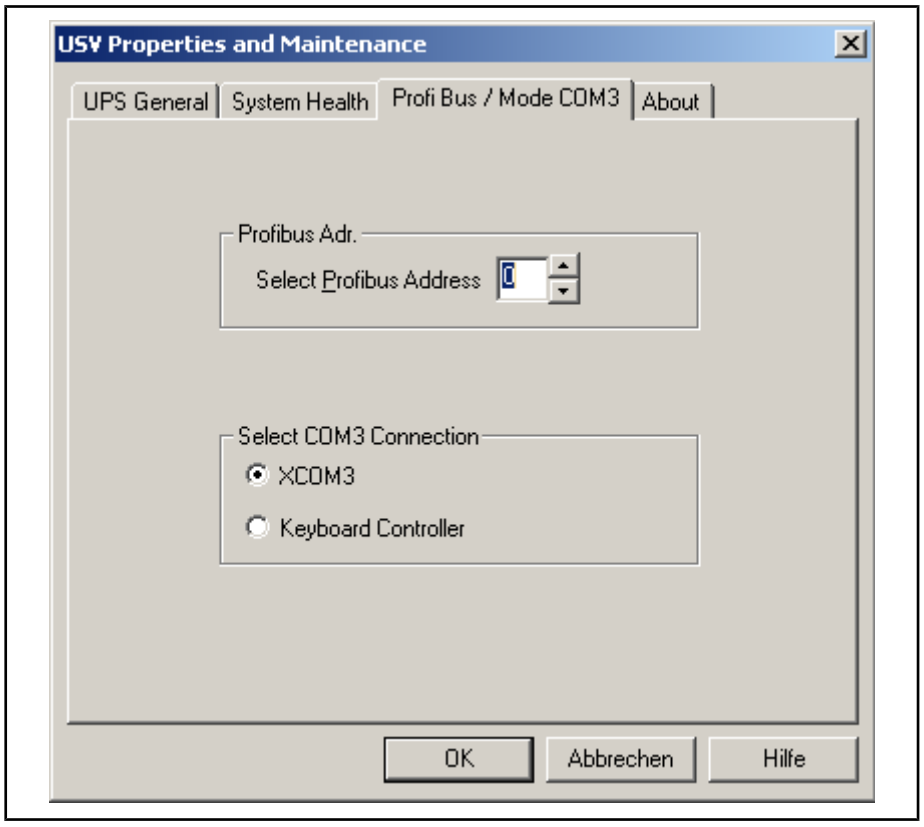


Fig.9-7: ***Profi Bus / Mode COM3*** *tab*

Select COM3 connection	
XCOM3	COM3 is accessible at connection XCOM3
Keyboard Controller	COM3 is internally connected with the keyboard controller to • request the state of the M-keys via the serial interface (see section "M-keys" in chapter 6 "Display and Operating Components" on page 29) or • reload firmware into the keyboard controller

Fig.9-8: *Select COM3 connection*

Software

☞ **The following applies to all settings:**

The UPS service is stopped. All changes will only be effective, when the PC is restarted (switch off and switch on the supply voltage again).

About

The **Shutdown Count** value indicated in the **About** tab indicates, how often the UPS has already shut down the system. A battery change is recommended after more than 3000 forced shutdowns by the UPS, but not later than the recommended maintenance interval, see "Battery" on page 23.

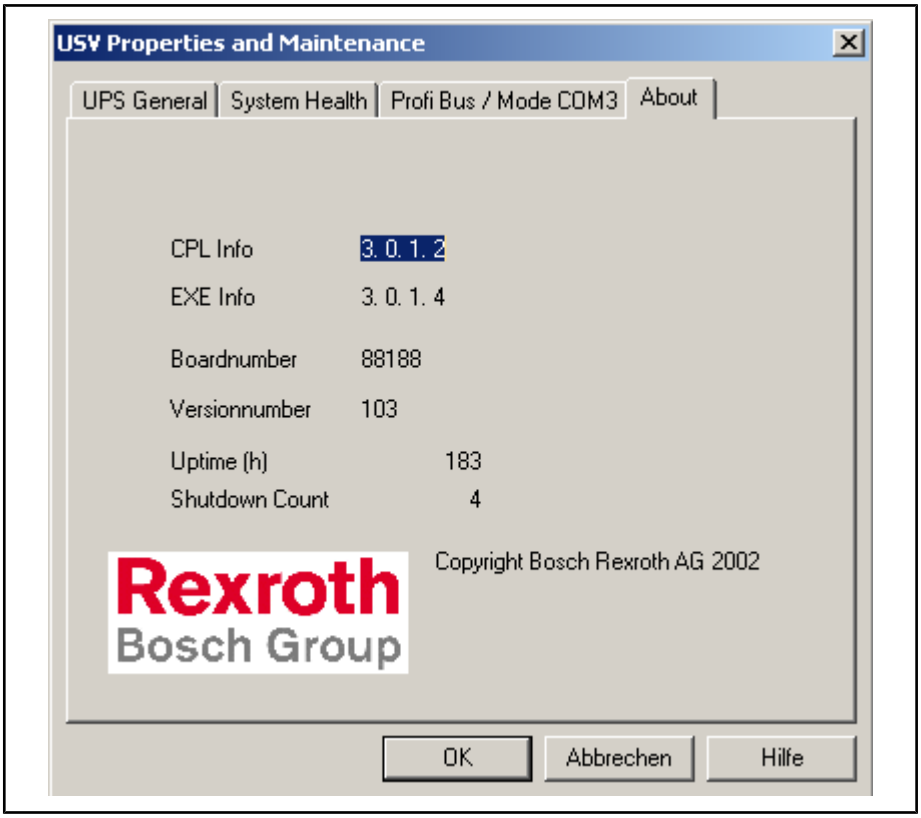


*Fig.9-9: **About** tab*

9.2 Touch Screen Software

For certain VDP-type displays a touch screen is integrated, that allows the operation via the touch-sensitive surface of the display.

To ensure the communication of the touch screen controller with the PC, the serial interface XCOM2 inside the device is used. Therefore, the XCOM2 interface must not be used on these devices.

The required driver software is to be installed by means of the installation software "BRCVInstall", which is archived on the desktop.

After the installation settings and changes in the application **Pointer Devices** in the Windows control panel are possible. The setup program can also be reached via **Start** ▸ **Programs** ▸ **UPDD** ▸ **Settings**

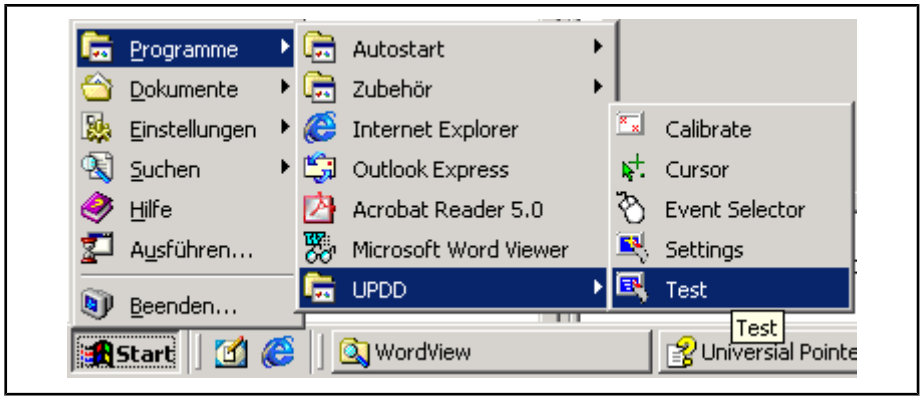


Fig.9-10: UPDD setup programs for the touch screen

A dialog for different settings is displayed:

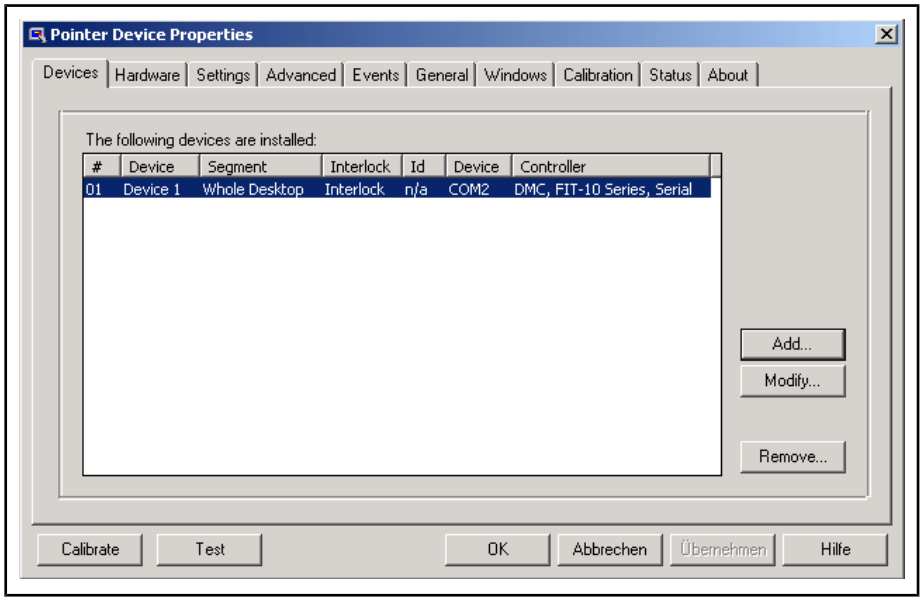


Fig.9-11: Dialog for touch screen settings

For further information, click on the **Help** button on the corresponding tab.

Using **Start** ▸ **Programs** ▸ **UPDD** (see chapter 9.2 "Touch Screen Software" on page 68) further programs, e.g. **Test** or **Calibrate** can be called, if necessary.

The program **Calibrate** might be of special interest. If required, the touch mouse can be calibrated with the help of this program. For this, touch, one after the other, the middle of the four crosses displayed on the screen.

The online help provides further information on these programs. The online help can be started with the "GENER-EN.CHM" file, which is also filed in the D:\Programs\UPDD\ folder.

10 Environmental Protection and Disposal

10.1 Environmental Protection

Production Processes

The products are made with energy- and resource-optimized production processes which allow re-using and recycling the resulting waste. We regularly try to replace pollutant-loaded raw materials and supplies by more environment-friendly alternatives.

No Release of Hazardous Substances

Our products do not contain any hazardous substances which may be released in the case of appropriate use. Normally, our products will not have any negativ influences on the environment.

Significant Components

Basically, our products contain the following components:

Electronic devices
- steel
- aluminum
- copper
- synthetic materials
- electronic components and modules

Motors
- steel
- aluminum
- copper
- brass
- magnetic materials
- electronic components and modules

10.2 Disposal

Return of Products

Our products can be returned to our premises free of charge for disposal. It is a precondition, however, that the products are free of oil, grease or other dirt.

Furthermore, the products returned for disposal must not contain any undue foreign material or foreign components.

Send the products ”free domicile” to the following address:

Bosch Rexroth AG
Electric Drives and Controls
Buergermeister-Dr.-Nebel-Strasse 2
97816 Lohr am Main, Germany

Packaging

The packaging materials consist of cardboard, wood and polystyrene. These materials can be recycled anywhere without any problem.

For ecological reasons, please refrain from returning the empty packages to us.

Batteries and Accumulators

Batteries and accumulators can be labeled with this symbol.

The symbol indicating "separate collection" for all batteries and accumulators is the crossed-out wheeled bin.

The end user within the EU is legally obligated to return used batteries. Outside the validity of the EU Directive 2006/66/EC keep the stipulated directives.

Used batteries can contain hazardous substances, which can harm the environment or the people´s health when they are improper stored or disposed of.

After use, the batteries or accumulators contained in Rexroth products have to be properly disposed of according to the country-specific collection.

Recycling

Most of the products can be recycled due to their high content of metal. In order to recycle the metal in the best possible way, the products must be disassembled into individual modules.

Environmental Protection and Disposal

Metals contained in electric and electronic modules can also be recycled by means of special separation processes.

Products made of plastics can contain flame retardants. These plastic parts are labeled according to EN ISO 1043. They have to be recycled separately or disposed of according to the valid legal requirements.

11 Ordering Information

11.1 Type Designation Code

The VPB 40.1 is available in various versions according to the following type designation code.

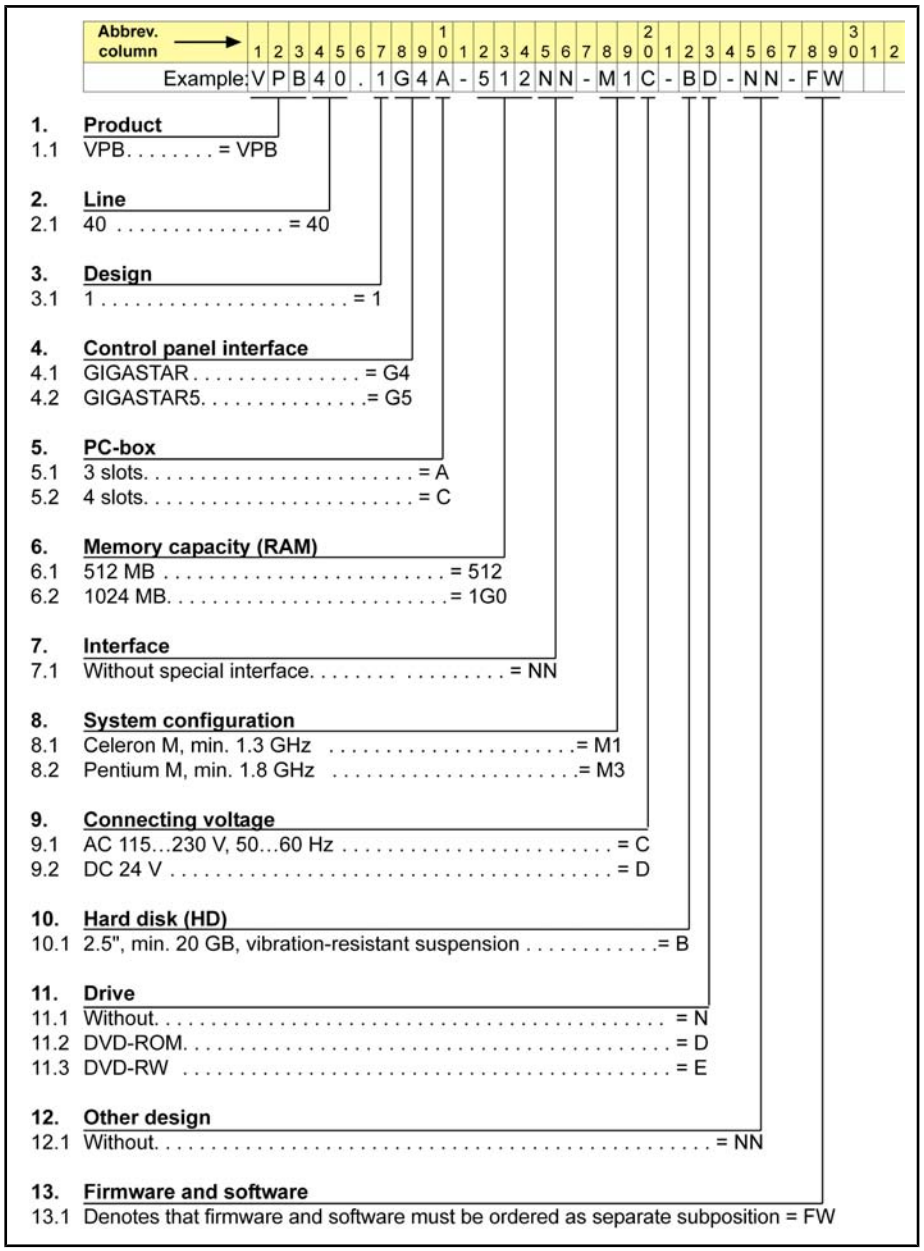

Abbrev. column
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
Example: V P B 4 0 . 1 G 4 A - 5 1 2 N N - M 1 C - B D - N N - F W
1. Product
1.1 VPB . . . . . = VPB
2. Line
2.1 40 . . . . . = 40
3. Design
3.1 1 . . . . . = 1
4. Control panel interface
4.1 GIGASTAR . . . . . = G4
4.2 GIGASTAR5. . . . . .= G5
5. PC-box
5.1 3 slots. . . . . = A
5.2 4 slots. . . . . = C
6. Memory capacity (RAM)
6.1 512 MB . . . . . = 512
6.2 1024 MB. . . . . .= 1G0
7. Interface
7.1 Without special interface. . . . . = NN
8. System configuration
8.1 Celeron M, min. 1.3 GHz . . . . . .= M1
8.2 Pentium M, min. 1.8 GHz . . . . . .= M3
9. Connecting voltage
9.1 AC 115...230 V, 50...60 Hz . . . . . = C
9.2 DC 24 V . . . . . = D
10. Hard disk (HD)
10.1 2.5", min. 20 GB, vibration-resistant suspension . . . . . .= B
11. Drive
11.1 Without. . . . . = N
11.2 DVD-ROM. . . . . = D
11.3 DVD-RW . . . . . = E
12. Other design
12.1 Without. . . . . = NN
13. Firmware and software
13.1 Denotes that firmware and software must be ordered as separate subposition = FW

Fig.11-1: Type designation code VPB 40.1

Ordering Information

11.2 Accessories

11.2.1 Network Connection

Order code	Parts number	Description
B-AC STECKER NETZ 230V	1070912881	Mains connector 230 V, male inlet connector for non-heating apparatus, angular, for self-mounting
BKS-U-N-NTZKAB-IPCR-HO-002,5-P	1070048937	Mains cable 230 V with female inlet connector for non-heating apparatus, angular, cable length 2.5 m

Fig.11-2: Connectors and cables

11.2.2 Battery Pack and cables

Order code	Parts number	Description
SUP-E01-BTV 16/40	1070170041	External battery kit for top-hat rail mounting
SUP-E02-BTV 16/40	R911170126	External battery kit for screw mounting
IKL0264/003,0	1070170040	Connecting cable for external battery pack BTV 16/40/60, cable length 3.0 m
IKL0264/001,0	1070170156	Connecting cable for external battery pack BTV 16/40/60, cable length 1.0 m

Fig.11-3: Battery pack and cables

11.2.3 Y-Repeater

There are two variants of the Y-repeater available to connect two VDPs to a control cabinet PC.

Order code	Parts number	Description
VAC01.1S-YG4-NNN	R911307623	Y-repeater for G4 display interface
VAC01.1S-YG4-EXTN	R911170364	Y-repeater for G4 and G5 display interface for long cables

Fig.11-4: Y-repeater

11.2.4 Connecting Cable to VDP 16, VDP 40 and VDP 60 (G4 and G5 Display Interface)

Use the following cables for a Y-repeater to connect the control cabinet PC to the Y-repeater as well as the Y-repeater to the VDP:

Order code	Parts number	Description
BKS-U-H-G4****-IPCVDP-001,0-P	R911307684	Connecting cable control cabinet PC – Y-repeater, flexible, 1 m (do **not** connect this cable directly to the VDP!)
BKS-U-H-G4****-IPCVDP-002,0-P	R911170723	Connecting cable control cabinet PC - VDP, highly flexible, 2 m
BKS-U-H-G4****-IPCVDP-005,0-P	R911306043	Connecting cable control cabinet PC – VDP, highly flexible, 5 m
BKS-U-H-G4****-IPCVDP-010,0-P	R911306046	Connecting cable control cabinet PC – VDP, highly flexible, 10 m
BKS-U-H-G4****-IPCVDP-015,0-P	R911308482	Connecting cable control cabinet PC – VDP, highly flexible, 15 m
BKS-U-H-G4****-IPCVDP-020,0-P	R911306047	Connecting cable control cabinet PC – VDP, highly flexible, 20 m
BKS-U-H-G4****-IPCVDP-025,0-P	R911170286	Connecting cable control cabinet PC – VDP, highly flexible, 25 m
BKS-U-H-G4****-IPCVDP-030,0-P	R911170287	Connecting cable control cabinet PC – VDP, highly flexible, 30 m
BKS-U-H-G4****-IPCVDP-035,0-P	R911170288	Connecting cable control cabinet PC – VDP, highly flexible, 35 m
BKS-U-N-G4****-IPCVDP-035,0-P	R911170777	Connecting cable control cabinet PC – VDP, non-flexible, 35 m
BKS-U-N-G4****-IPCVDP-040,0-P	R911170289	Connecting cable control cabinet PC – VDP, non-flexible, 40 m
BKS-U-N-G4****-IPCVDP-045,0-P	R911170290	Connecting cable control cabinet PC – VDP, non-flexible, 45 m
BKS-U-N-G4****-IPCVDP-050,0-P	R911170291	Connecting cable control cabinet PC – VDP, non-flexible, 50 m

Fig.11-5: Connecting cables to VDP 16, VDP 40 and VDP 60

☞ Please refer to the relevant documentation of the operator displays (VDP 16.3/40.3/60.3) for possible use of the cables.

12 Service and Support

Our service helpdesk at our headquarters in Lohr, Germany and our worldwide service will assist you with all kinds of enquiries. You can reach us **around the clock - even on weekend and on holidays**.

	Helpdesk	Service Hotline Worldwide
Phone	**+49 (0) 9352 40 50 60**	Outwith Germany please contact our sales/service office in your area first. For hotline numbers refer to the sales office addresses on the Internet.
Fax	**+49 (0) 9352 40 49 41**	
E-mail	service.svc@boschrexroth.de	
Internet	http://www.boschrexroth.com You will also find additional notes regarding service, maintenance (e.g. delivery addresses) and training.	

Preparing Information

For quick and efficient help please have the following information ready:

- Detailed description of the fault and the circumstances
- Information on the type plate of the affected products, especially type codes and serial numbers
- Your phone, fax numbers and e-mail address so we can contact you in case of questions.

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Notes

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